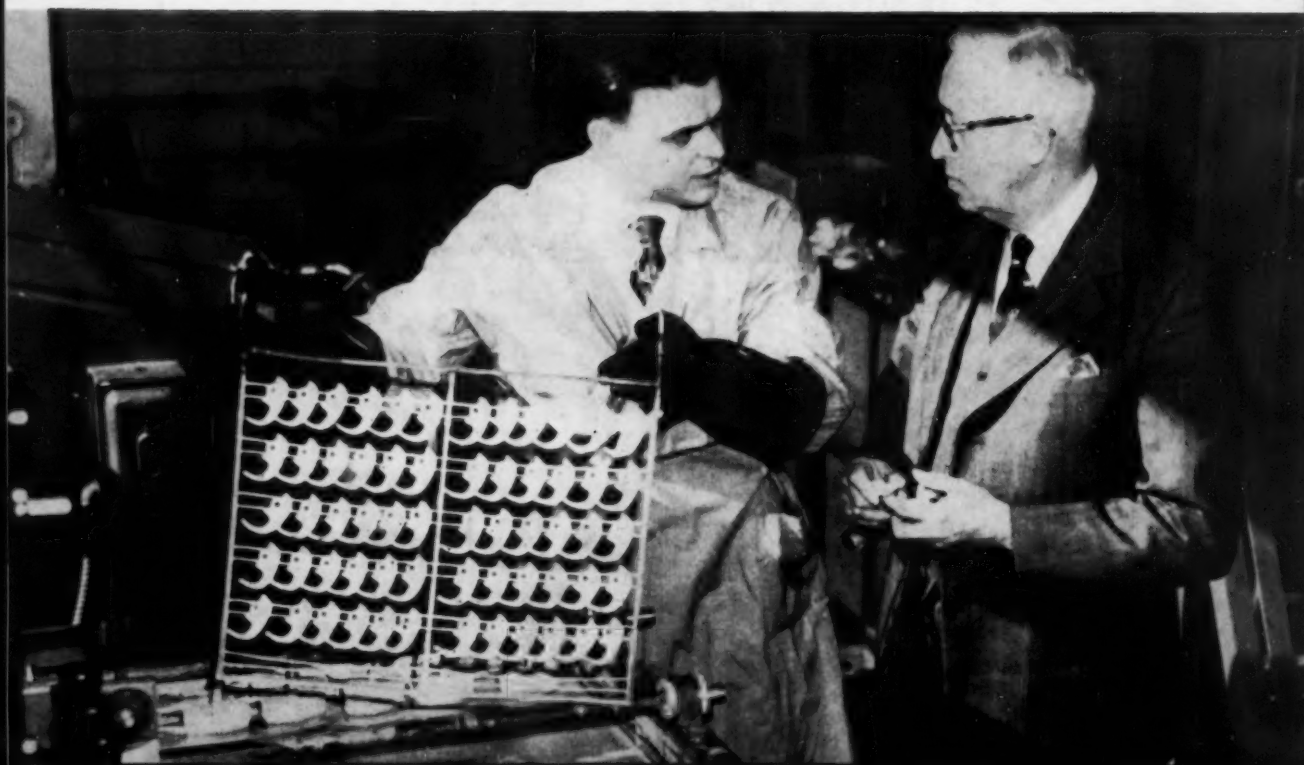


October 18, 1956

The **IRON AGE**

The National Metalworking Weekly



Plating Seeks Simple Adhesion Tests P. 123

Detroit Debate: The Future Auto Engine P. 100

Report New Oxygen Steelmaking Process P. 126

Digest of the Week P-2

nearly anyone can obtain
Cupola Output

but it takes cupola specialists
to make operation profitable!



**WRITE FOR THESE
INFORMATIVE BULLETINS**

Here are seven bulletins from Whiting's extensive library on cupola design and operation that will help you in considering improved methods and ways for obtaining maximum output from your cupola. Send for any or all of the bulletins you need—today! When ordering, please specify by "FO" number shown.



FO-2 Tips on
improving
cupola charging



FO-3 Hot-blast



FO-5 Here's
how to save
melting fuel



FO-7 Cupola
blast control



FO-8 Suggestions for
solving some cupola
operation problems




FO-9 Review of
foundry-cupola
gasses and temperatures

If you are planning the installation of a cupola now or in the near future, or even if you believe your cupola is operating successfully, it will definitely pay you to consider the latest developments that "tailor" the cupola to meet your particular metal requirements. Whiting has made many advancements, not only in cupola design but also in equipment used in conjunction with cupolas, that lead to better metal at lower costs.

In designing and planning a new cupola, for example, the application of scientific principles in construction and arrangement of tuyeres is necessary to provide the proper volume of air to the coke bed. Tons of coke a day can be wasted through mis-use or improper arrangement of tuyeres. Blast, blowers and many other operation factors should be investigated. Fortunately, a great deal can be accomplished with old cupolas. Usually they can be easily modified to incorporate the latest Whiting cupola accessories.

For seventy-two years Whiting has engineered and manufactured cupolas and cupola accessories. Whiting engineering service includes (1) analyses of requirements, (2) layout and selection of equipment, (3) manufacturing supervision, (4) supervision of erection, (5) initial operation, and (6) periodic field checkups. Talk over your plans now with a Whiting engineer!

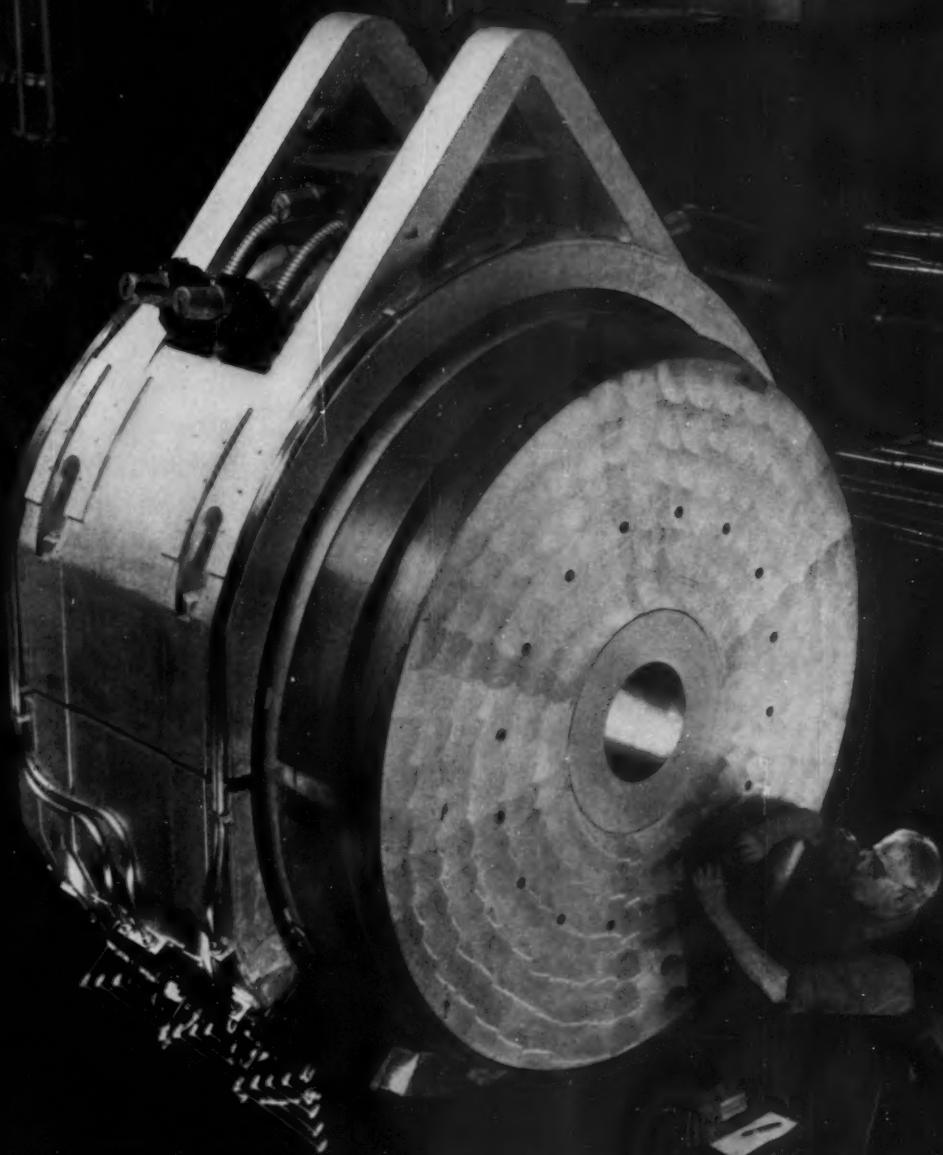
WHITING CORPORATION, 15601 Lathrop Avenue, Harvey, Illinois



*how to make your cupola
operation more efficient*

WHITING CORPORATION
HARVEY, ILLINOIS

**Another
WHITING SERVICE**



Puzzle: Find the Sleeve

Unless you had a hand in the design or manufacture of this alloy steel billet-container, you might have trouble finding the sleeve we're talking about. Yet part of it is in plain sight.

First of all, we'd better explain a little about the assembly. That outer shell with the lifter loops is heating equipment. Just inside this shell is the billet-container proper, made entirely in the Bethlehem shops. The whole device will be part of one of the 8,000-ton extrusion presses designed and built by Loewy-Hydropress, Division of Bald-

win-Lima-Hamilton, for the U.S.A.F. Heavy Press Program.

Now, getting back to the mystery of the sleeve. The container is made up basically of three layers of forgings — a liner (plainly visible), the sleeve, and an outer layer. Because of the perfect shrink fit and the accurate machining, you can't see where the sleeve meets the outer layer. But the sleeve is there, all right, and it runs the full length of the assembly.

Bethlehem has handled many forging and machining jobs that were bigger

than this one; the whole assembly weighs only 41 tons. But we've had very few that required more careful workmanship. The container shown here is one of several that Bethlehem was commissioned to do — and all will of course be built to the same high standards.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL



Oct. 18, 1956—Vol. 178, No. 16

The IRON AGE

Digest of the Week in Metalworking

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Chestnut and 56th Sts. Philadelphia 39, Pa.

NEWS DEVELOPMENTS

WHY STEEL LOOKS

TO SINTERED ORE P. 83

With 103 sintering plants in operation and 18 more under construction,



use of sinter is becoming accepted practice in the U. S. Reasons: blast furnace output increases 15 pct, high coke costs are bypassed and ore fines utilized.

HIGHWAY BUILDERS LIST

STEEL NEEDS P. 86

Road programs will require almost 49 million tons of steel in next thirteen years. Structural will make up half of that total. Getting enough wide flange shapes could be a problem with concrete substituting.

ALUMINA: CAN ANACONDA

MAKE CLAY PAY? P. 88

Anaconda's announcement that it intends to begin production of alumina from clay has stirred up some controversy in the industry. No one says it can't be done, but few can see how it's commercially feasible.

INDUSTRIAL USES OF ISOTOPES

ARE GROWING P. 89

Metals industry firms rank high among those putting radioactive isotopes to work. Major applications include gaging, thickness control and radiographic inspection. Over 400 industrial companies use isotopes for gaging.



PROPER ADHESION of coatings in electroplating depends partly on good racking. For other factors important in measuring and maintaining adhesion quality see "Plating Adhesion" story starting P. 123. (Hansen-Van Winkle-Munning photo.)

ROOM FOR IMPROVEMENT IN FASTENERS MARKET

P. 91

Producers of fasteners are doing fair to good. Picture varies among makers and markets. Automotive, the big customer, is behind in its ordering, but is expected to come in later. Aircraft and specialty suppliers are in better position than most. Hardware jobber inventories are swollen due to price hedging and new orders are down in some cases by 30 pct.

FEATURE ARTICLES

PLATING ADHESION: WHICH TEST DO YOU BUY?

P. 123

"Cheaper by the dozen" doesn't apply to tests for plating adhesion. On the contrary, as the number of available test methods pile up, the subject of adhesion seems to grow even more confusing. Some standards are obviously essential. But which? What progress is being made to help the millions of plating users measure and maintain the quality of their products? Here are a few answers.

NEW OXYGEN STEELMAKING PROCESS PAYS OFF

P. 126

Now in commercial operation in Sweden, a new rotary oxygen steel-making process christened Kad-Do is described exclusively by THE IRON AGE. Product of giant Stora Kopparberg firm, the process will get close scrutiny from American steelmakers. Major advantages include clean quality steel at lower cost, controlled carbon without need for recarburization.

CAST-PLASTIC TOOLS HONE GEARS FAST

P. 130

Improved running characteristics of gears in service can result from honing with plastic tooling. A one-minute honing cycle improves tooth form and surface smoothness sufficiently to substantially reduce gear noise. Tooling is precision cast in abrasive-impregnated plastic.

IMPROVED MOLD SANDS DROP SHELL-CASTING COSTS

P. 132

Resin-coated sand has largely superseded the dry resin-sand mix formerly used in shell molds. Improved cold process coating equipment now encourages use of the less costly sand. Clay-bearing sands promise still another cost reduction. Even sub-angular, clay-bearing bank sands at \$3 a ton are satisfactory, instead of \$10 per ton material.

WELD STRONGER JOINTS IN LOW-ALLOY STEELS

P. 135

Flash and fusion weld-fabrication can combine with use of high-strength, low-alloy steels to offer three possibilities: improved performance at similar costs, better use of materials at lower cost, or similar performance at less weight or cost. Welded structures can perform at strength levels in excess of 200,000 psi.

MARKETS AND PRICES

FOUNDRIES ARE MOLDING A BRIGHT FUTURE

P. 90

Gray-iron foundries shoot for sales figure of \$3 billion in '56 on all-time record of 15 million ton production. Trend is toward faster, high production methods. New developments include CO₂ process for hardening cores and molds without drying, and shell molding.

TRADE FAIRS: THE ROAD TO FOREIGN MARKETS

P. 92

In 1955 U. S. trade missions representing U. S. manufacturers exhibiting in foreign trade fairs received over 60,000 inquiries, of which 8000 were direct invitations to transact business. The Commerce Dept. has a bigger and better program lined up and industry is invited to take part.

HOW LONG WILL TIGHT MONEY POLICY LAST?

P. 105

FRB insists there will be no early letup in money policy. However politics may enter picture if hard money appears to be costing votes as election approaches. Inflationary trends are still very strong.

AIRCRAFT PRODUCTION WILL UNDERGO CHANGES

P. 107

Metals industry will have important part in production of tomorrow's planes. More high strength steel and titanium to be used. Metalworking needs will require grinders and cutters capable of operating at greater speeds.

STEEL BRACES FOR BIG MARKET PUSH

P. 183

Even without strong support from automotive, the steel market has shown surprising strength. Now there are signs that Detroit is ready to move in for heavier tonnages. Outlook: Tighter market into 1957.

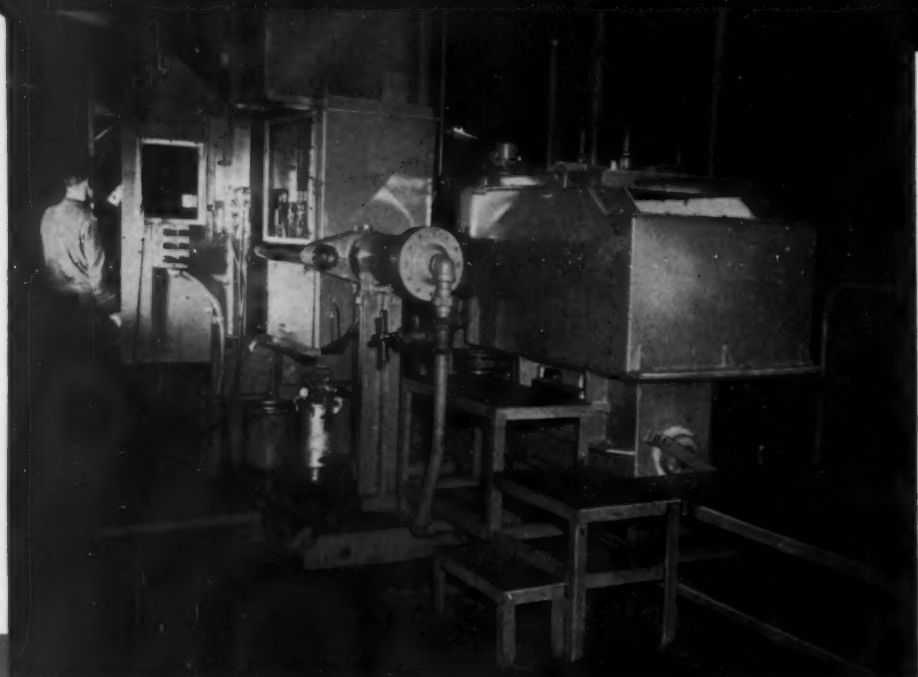
NEXT WEEK:

HOW BIG A CUSTOMER IS DETROIT?

With new car models just making their debut, THE IRON AGE takes an inquiring look at Detroit from a supplier standpoint. How much does the auto industry buy in a year? How many tons of steel and other products? Answers next week.



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Don't ever be in doubt...

Just call
the one
that's in...
or talk to
the one
that's out!



Remember the little weather prophet that used to hang on grandma's front porch? One figure represented cloudy weather and the other fair weather. As one figure came out the other moved back in. Two Ohio Ferro Sales Executives operate the same way except that they both represent fair weather for our customers. One stays at the home office to keep things running smoothly, while the other one is in the field conferring personally with our customers and observing their problems. As soon as the "out" man comes in, the "in" man pops out.

So you see, authority to make important sales decisions for your convenience not only sits at home but it goes abroad to serve you where you are.

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- SPECIAL BLOCKING 50% FERRO - SILICON
- SILICON METAL
- HIGH CARBON FERRO-CHROME
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Indexed in the Industrial Arts Index
and the Engineering Index.



EDITORIAL

Say It With a Vote!

♦ THE DEMOCRATS are going all out in their plans to get out the vote in November. Cars, chauffeurs, baby sitters, relatives and what-not will be used to get people to the polls in strategic areas of the country.

From Republicans comes the news that they too are putting on the heat to get their side as well represented as possible. We hope both succeed. There are more than 100 million eligible to cast their votes. If less than 65 million of us are going to the polls we need lecturing; or "gentle" reminders.

There is always the probability that businessmen talk more about voting and do less of it than does the man on the street—or the woman in the home or in business. Gripes are a natural outlet. They would sound a lot better if the record showed we had voted regularly.

Maybe we did vote the last time; and also expect to vote again in a few weeks. But are we doing all we can to see that everyone else in the family votes? Did Grandpa vote last time; will he and Grandma get a chance to vote this year or will we be too busy to make it easy for them to get to the polls? What about the grown-up children? Will we give them the vote-pitch?

If people ever needed to use their voting privilege, they need to do it now. The world is in turmoil and we have many domestic problems. We can't carry on post mortems if we refuse to cast our ballot.

There is some peculiar nonsense going the rounds these days. It runs something like this: "I don't like either fellow so I won't vote at all." That's kid stuff. It is similar to "If I can't have my way I'll take my marbles and go home." Perhaps a lot of people will use this gag because they are too lazy to go to the polls.

We shouldn't need gimmicks to get people to vote. But this year more than ever before some politicians are using everything in—and out—of the book to get their side to the voting place. That means that others—especially businessmen—should do everything they can to see that their friends, relatives and employees get the chance to choose their man.

Remember, it is a privilege to vote—not a right. Use it!

Tom Campbell

EDITOR-IN-CHIEF

STEP UP Metal-Sawing Production in ALL of 7 ways:



• The New No. 2-8 Automatic Motch & Merryweather Circular Sawing Machine.

1. LESS TIME
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3. MILLED FINISH
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and all other tool
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BUILDERS OF AUTOMATIC PRECISION CUT-OFF, MILLING, AND SPECIAL MACHINERY

dear editor:

letters from readers

Inspection

Sir:

Your article, "How to Get More for Your Inspection Dollar," appearing in the Sept. 27, 1956, issue of THE IRON AGE is most interesting and, I believe, of great value to us here. *E. A. Forsyth, Mgr. Production Programming Dept., Steel Div., Ford Motor Co., Dearborn, Mich.*

Sir:

I would like to obtain six copies of your "How to Get More for Your Inspection Dollar." I believe that these copies will be of value to our Inspection Departments throughout our plant. *A. Domino, Ass't Purch. Agent, Allen-Bradley Co., Milwaukee, Wis.*

From Down Under

Sir:

May I offer my congratulations to you for your article "How to Get More for Your Plating Dollar", in the June 28 issue.

The article proved most interesting and informative, but most interesting was the statement that reprints were available on request. If it is not too far away, would you mind sending two copies to the attention of the undersigned. We hope that we are not too late but your magazine has just reached us. *C. J. Cocks, Works Chemist, Jason Industries Ltd., Bentley, Western Australia.*

Sir:

Having read "More for Your Inspection Dollar", in the September 27 issue of THE IRON AGE and having found it very informative, it is requested that I be furnished several copies of this valuable document. In my opinion it is one of the

best articles I have ever read. *J. C. Johnson, Chief Civilian Inspector, Quality Control Dept., Naval Ammunition Depot, Crane, Ind.*

Sir:

In the September 27, 1956 issue. I read an article on "How to Get More for Your Inspection Dollar." It is one of the most complete and practical dissertations that I have read. *H. Wehrwein, Standards Engineer, Continental Machines Inc., Savage, Minn.*

Sir:

Your article on "How to Get More for Your Inspection Dollar" was superb. Please send me an extra copy and bill me personally should there be any cost attached. *P. Bobich, Q. C. Manager, Aerovox Corp., Myrtle Beach, S. C.*

For The Library

Sir:

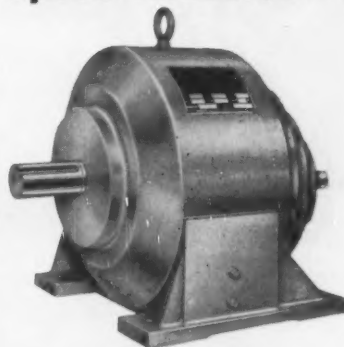
One of the engineers of this company has asked me to write to you and request an extra copy, if you please, of each of the parts of the series of excellent articles, of which the Special Feature appearing in the June 28 issue is entitled: Plating, Metal Cleaning and Finishing Handbook.

This particular engineer has discussed the articles with others of this company and all agree that they are of great importance to them in their work.

We would all like to see a set of these articles in our regular Library holding, and if they are available to us we will greatly appreciate having a set for Library use. *J. F. Mackenzie, Librarian, Airesearch Mfg. Co. of Arizona, Div. of Garrett Corp., Phoenix, Arizona.*

Copies are available.—Ed.

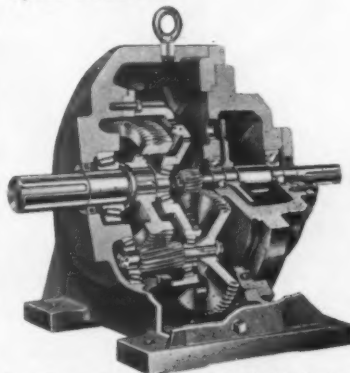
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NOW—all the advantages of
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Intricate Shell Coring in**



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These qualities particularly recommend Eaton Permanent Mold Gray Iron Castings for such uses as high pressure control mechanisms, refrigeration and air conditioning parts, power steering and power braking components, household appliance parts, pump bodies, hydraulic cylinders, and countless other critical applications.

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VASSAR, MICHIGAN

fatigue cracks

Overseas Report

When IRON AGE's editor-in-chief Tom Campbell flew to Sweden a few weeks ago to get Stora Kopparberg's rotary oxygen steelmaking story (see p. 126) it was routine. Routine that is for IRON AGE editors to go anywhere, anytime—just so they get there first. And just so they bring developments to you when they are new—and fresh.

Tom's trip was a calm one. He visited three steel plants, a paper mill, a copper mine, an iron ore mine and a modern limestone plant. At one plant (SKF's Hofors Bruk) he met and talked with SKF's Ing. L. C. Uhrus, an old friend of IRON AGE—reads it every week. While there Tom inspected one of the most modern sponge iron plants in the world.

Touring this plant with John Stalhed, Stora's sponge iron expert, Tom got into quite a discussion with Ing. Uhrus about steel quality. They both agreed that Hofors and Philadelphia plants of SKF both used good steel.

Here is a picture of Tom giving an "off the cuff talk" about American business conditions to Stora's Falun and Domnarvet officials. The "stern and reserved Swede" sec-

ond from Tom's right is Sixten Wohlfahrt who runs the Domnarvet steel plant—and is a fine friend of Morgan Construction officials. First fellow on Tom's right is Professor Bo Kalling, inventor of the Stora steel process.

It was an experience for Tom to interview Stora's President H. Abenius, a reserved European.

Puzzlers

George Kostick, Product Design Engineer, Tel-Instrument Electronics Corp. says, "In answer to the August 23rd puzzler, it is evident that the \$2.00 the clerk took was added twice to arrive at the missing dollar. The \$27.00 already included his \$2.00 take plus the \$3.00 returned equals \$30.00. "Can't see anything wrong with that . . . and the winners:

R. Roseman, The Glidden Co.; Bill Bayer, Hydraulic Press Mfg. Co.; C. B. Smith, P.C.T.W., Inc.; V. M. Johnson, Editor, ACI Bulletin; John Homer, Jr., James Young and Henry Buresh, Collins Radio Co.; W. R. Moss, Chicago Auto Wrecking Co.; R. S. Neymark, C. F. Braun & Co.; C. W. McKinley, AC Spark Plug; and D. M. Ertner, Western Electric, St. Paul, Minn.



Editor-in-Chief Tom Campbell and friends (left to right): R. Rydahl, F. Johanson, S. Wohlfahrt, B. Kalling of Sweden's Stora Kopparberg.

"PHOSPHOR BRONZE."

a tough, resilient, corrosion-resistant alloy . . . is a vital part of our daily living . . .



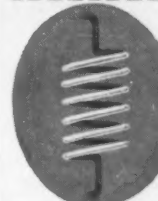
ELECTRIC MOTORS

. . . run better and longer with bearings and wearing parts made of Elephant Brand Phosphor Bronze.



SWITCHES

. . . owe much of their life and usefulness to fatigue resisting parts of Elephant Brand Phosphor Bronze.



SPRINGS

. . . hold their temper and bounce longer and better if they are made of Elephant Brand Phosphor Bronze.



MARINE EQUIPMENT

. . . resists water and weather with engine parts and hardware made of Elephant Brand Phosphor Bronze.



ELECTRONIC EQUIPMENT

. . . functions accurately and efficiently with components of Elephant Brand Phosphor Bronze.

The best bears either of these two marks

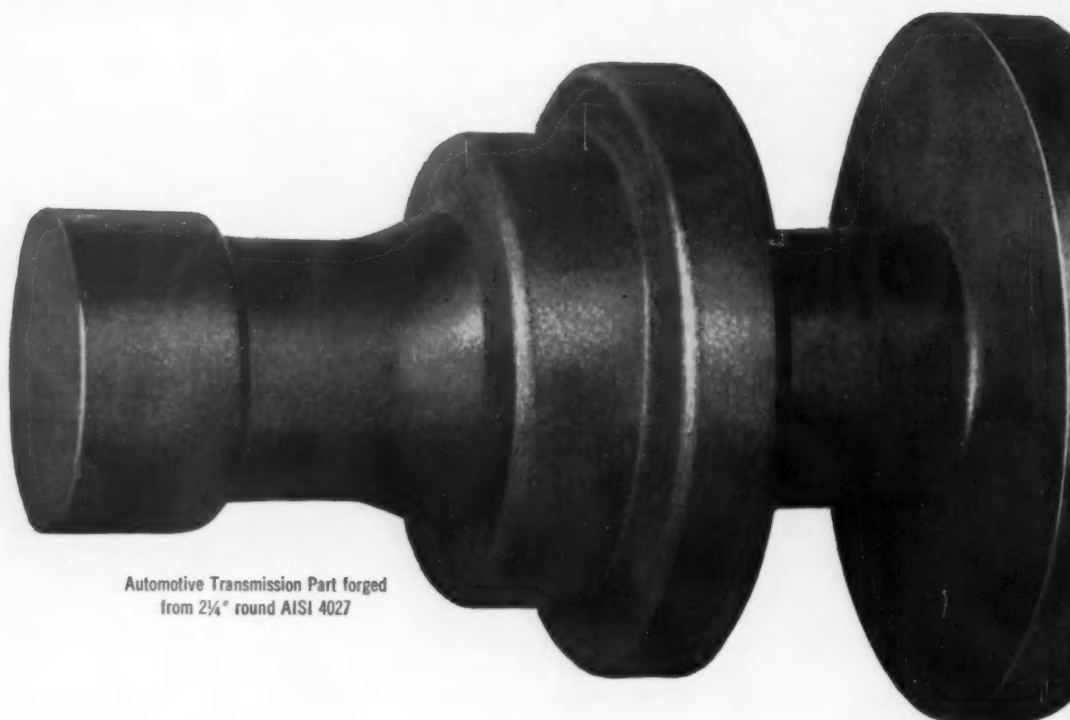


ELEPHANT BRAND®

THE PHOSPHOR BRONZE CORPORATION
Subsidiary of The Seymour Manufacturing Company
2 Franklin Street, Seymour, Connecticut

FORGEABILITY
MACHINABILITY
HEAT TREATING PROPERTIES

BALANCED TO GIVE RESULTS



Automotive Transmission Part forged
from 2 1/4" round AISI 4027



Forging Quality Steel Bars

For high-quality forgings at low production costs you need forging steels with the right balance of machinability, forgeability and heat treating properties in carbon and alloy grades.

At Jones & Laughlin, strict metallurgical control of every process from ore mine to finishing mill assures the correct balance of these essentials for high-quality forgings.

J&L's staff of experienced metallurgists is available to analyze your particular requirements.

J & L FORGING STEELS—EXACTLY TO SPECIFICATION

Jones & Laughlin
STEEL CORPORATION • PITTSBURGH

dates to remember

OCTOBER

Conveyors Equipment Manufacturers Assn.—23rd annual meeting, Oct. 20-23, The Greenbrier, White Sulphur Springs, W. Va. Society headquarters, One Thomas Circle, Washington, D.C.

American Standards Assn.—Annual meeting, Oct. 22-24, Roosevelt Hotel, New York. Assn. headquarters, 70 East 45th St., New York.

Aluminum Warehouse Assn.—Annual meeting, Oct. 24-26, The Greenbrier, White Sulphur Springs, W. Va. Assn. headquarters, 1900 Arch St., Philadelphia.

EXPOSITIONS

National Industrial Exposition & Management Conferences—Oct. 22-26, Detroit.

Society Of Industrial Packaging And Materials Handling Engineers—Oct. 23-25, St. Louis.

Third International Automation Exposition—Nov. 26-30, New York.

American Zinc Institute, Inc.—Fall meeting, Oct. 25-26, The Royal Connaught Hotel, Hamilton, Ontario. Society headquarters, 60 East 42nd St., New York.

Society For Advancement of Management—Annual fall conference, Oct. 25-26, Hotel Statler, New York. Society headquarters, 74 Fifth Ave., New York.

American Gear Manufacturers Assn.—Semi-annual meeting, Oct. 27-31, Edgewater Beach Hotel, Chicago. Assn. headquarters, One Thomas Circle, Washington, D.C.

American Institute of Steel Construction, Inc.—Annual convention, Oct. 28-Nov. 1, The Greenbrier Hotel, White Sulphur Springs, W. Va. Society headquarters, 101 Park Ave., New York.

Truck Body and Equipment Assn., Inc.—Convention and exhibit, Oct. 29-31, Sherman Hotel, Chicago. Society headquarters, 1616 K St., N.W., Washington 6, D.C.

Gray Iron Founders Society, Inc.—Annual meeting, Oct. 30-Nov. 2, The Homestead, Hot Springs, Va. Society headquarters, 930 Nat. City-E 6th Bldg., Cleveland.

The Wire Assn.—Annual convention, Oct. 29-Nov. 1, Penn-Sheraton Hotel, Pittsburgh. Assn. headquarters, 453 Main St., Stamford, Conn.

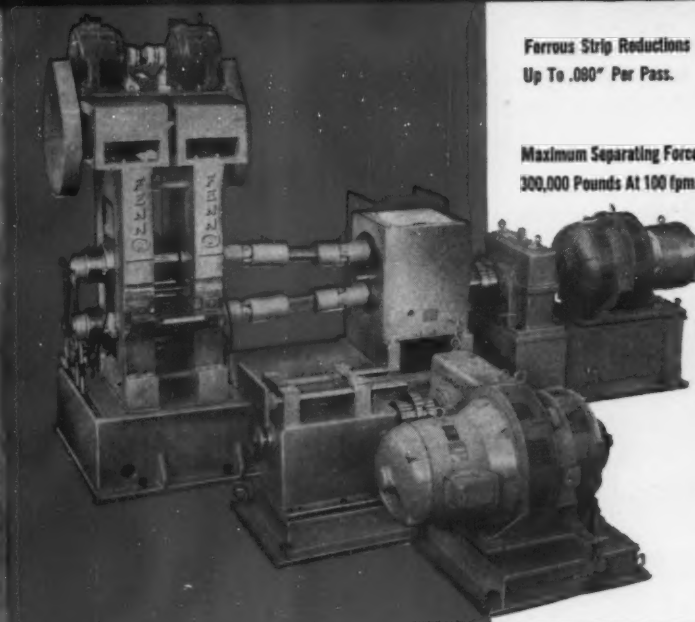
NOVEMBER

Instrument Society of America—Symposium, Nov. 7-8, Bellevue-Stratford Hotel, Philadelphia. Society headquarters, 1319 Allegheny Ave., Pittsburgh.

Porcelain Enamel Institute—18th annual shop practice forum, Nov. 7-9, University of Illinois, Urbana, Ill. Society headquarters, Associations Bldg., 1145 Nineteenth St., N.W., Washington, D.C.

FENN INTRODUCES A

NEW LARGE LABORATORY ROLLING MILL



Ferrous Strip Reductions
Up To .000" Per Pass.

Maximum Separating Force
300,000 Pounds At 100 fpm.

PERMITS HEAVY REDUCTIONS IN THE LABORATORY ON FERROUS STRIP

Fenn's new Model 4-083 Combination Type Laboratory Rolling Mill, a companion to the popular smaller Fenn Mill, is capable of taking heavy reductions on ferrous strip at all speeds between 100 fpm and 500 fpm. The mill ($2\frac{1}{2}$ " x $8\frac{3}{4}$ " x 8") can be used as a two-high mill, or as a four-high mill featuring driven back-up rolls or work rolls, and many drive combinations are possible to meet customer specifications. Important features of the new mill include a dual motor power screw-down unit, force feed lubrication system, and auxiliary operator control stations.



COMPLETE MILL SPECIFICATIONS

sent upon request.

Fenn engineering service is available to help you solve your rolling problems.



Precision
Rolling Mills



Turks Heads



Wire Shaping
Mills

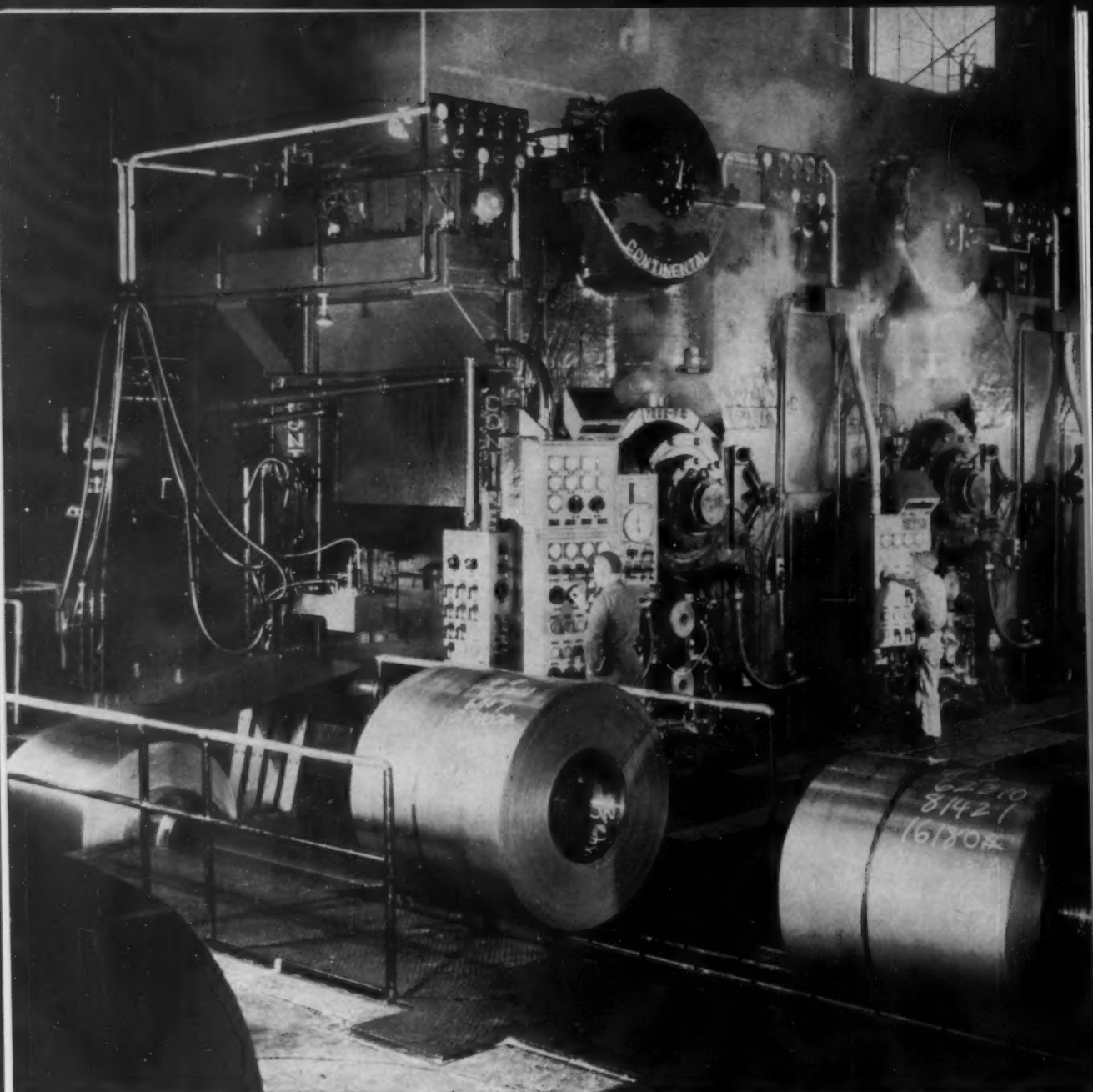


Swaging Machines



Wire and Tube
Drawing Machines

FENN MANUFACTURING COMPANY, 307 FENN ROAD, NEWINGTON, CONNECTICUT

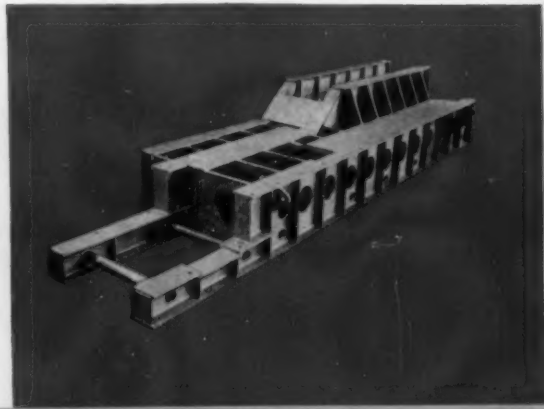


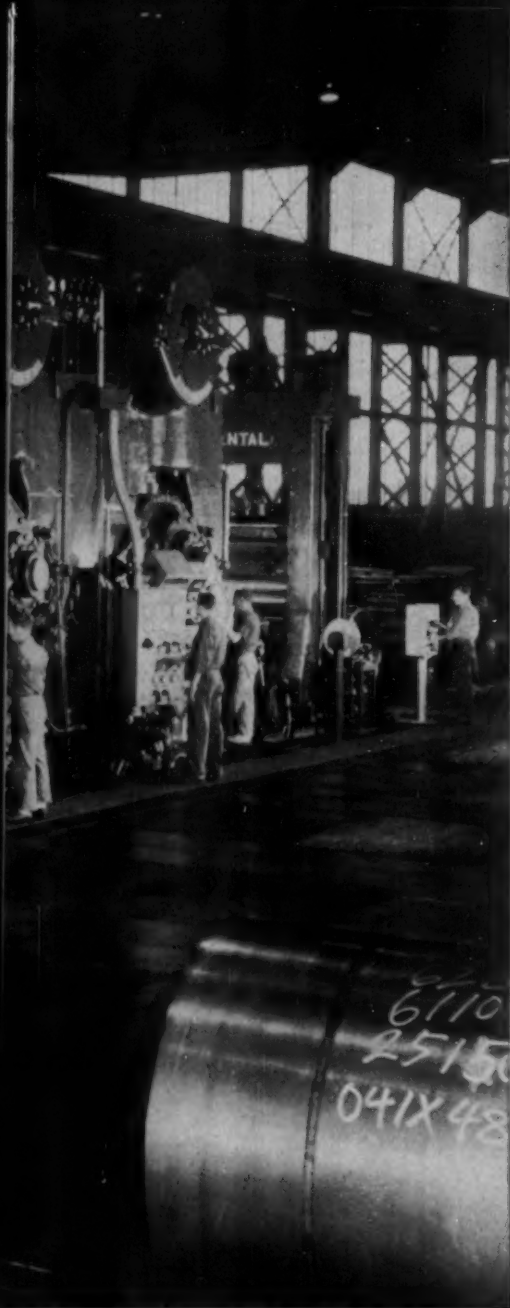
CONTINENTAL high-speed 21"x53"x60", 4-stand tandem cold mill in the Gibraltar Plant of the McLouth Steel Corporation.

CASTINGS—carbon and alloy steel castings from 20 to 250,000 pounds.

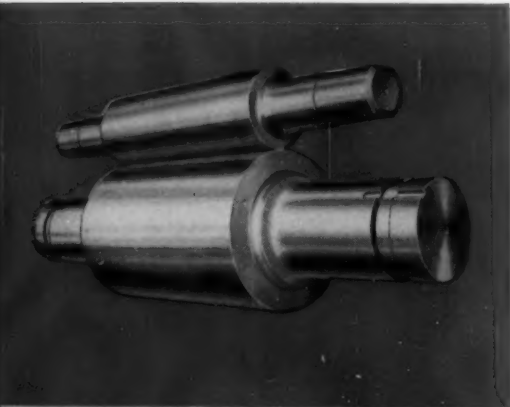


WELDMENTS—fabricated steel plate, or cast-weld design.





ROLLS—Iron, alloy iron and steel rolls for all types of rolling mills.



BLAW-KNOX

makes what it takes
to cold roll
at high speeds

In the Gibraltar Plant of McLouth Steel, this modern CONTINENTAL 60-inch, 4-stand tandem cold mill rolls steel at delivery speeds in excess of 3,000 fpm.

Designed to meet specific customer requirements, the mill has interesting features, such as— (1) entry and delivery coil conveyors of this cold strip mill, and two single-stand skin-pass mills, are at floor level—which provides greater safety, more efficient handling and easy inspection of all coils during processing. (2) mill equipment has built-in raceways to carry the electrical cables—which simplified the installation and provides easy access for maintenance.

BLAW-KNOX designs and builds *complete* rolling mill installations—assumes undivided responsibility from preliminary engineering to satisfactory operation. At any time we'll be glad to discuss your plans with you.

BLAW-KNOX COMPANY

Foundry and Mill Machinery Division

Blaw-Knox Building • 300 Sixth Avenue
Pittsburgh 22, Pennsylvania

Complete Rolling Mill Installations... Including all auxiliary equipment... for ferrous and non-ferrous metals

Hot strip mills • cold strip mills • slabbing mills • temper mills • universal mills • plate mills • blooming mills • structural mills • rail mills • billet mills • rod mills • merchant mills... roll lathes • chippers • special machinery • and complete auxiliary equipment.





Don't call **NAMES**— Call **"ELL" & "ESS"!**

Down, boys, down. There's a better way to settle that difference of opinion.
Call "Ell" & "Ess"—Lamson & Sessions, to you—and we'll tell you
the best, most economical way to solve that fastener problem.

When it comes to bolts and nuts, we've got the answers. Our
files are bursting with "how to fasten it" data . . . and
we're bursting to share it with you.

So before you get hot under the collar, get hot on the phone . . .
and call in those helpful fastener fellows "Ell" & "Ess".

It will save time, trouble and tempers!

And remember, there's no charge for "Ell" & "Ess" service. It's yours for the asking.



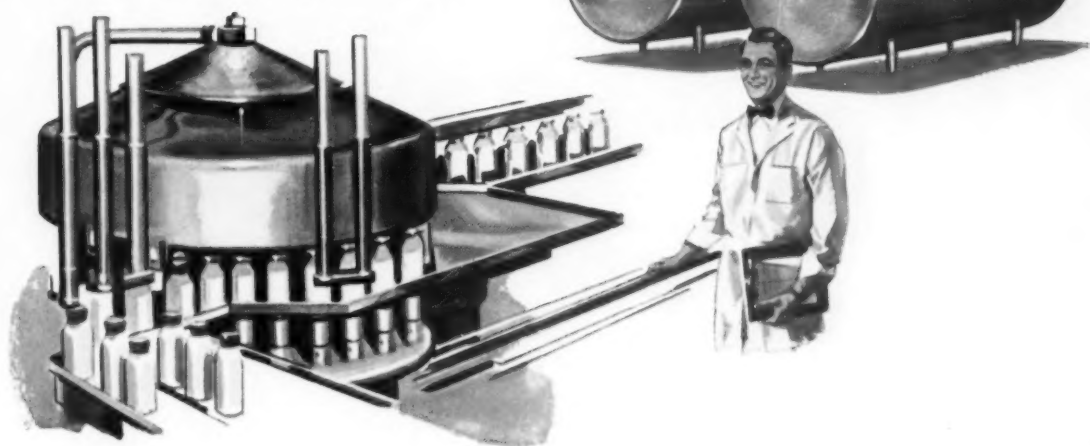
The **LAMSON & SESSIONS Co.**

1971 West 85th Street • Cleveland 2, Ohio
PLANTS AT CLEVELAND AND KENT, OHIO • BIRMINGHAM • CHICAGO

from cow to container...



stainless steel
safeguards the purity
of your dairy products



Dairymen and milk-product plant operators know that Stainless Steel is the only metal that year after year effectively resists acid corrosion. It can easily be kept clean and sterile and imparts no odor in contact with the product.

Through all the stages of milking, transportation, processing and packaging Stainless Steel completely safeguards the delicate flavor and highly sensitive qualities of milk and cream, and milk products like butter, cheese, ice cream and powdered milk.

The delicious taste of your dairy products and the assurance of their purity is due to the dairyman's extreme care and scientific methods and the use of Stainless Steel equipment.

Mc LOUTH
STAINLESS
STEEL

For the product you make today and the product you plan for tomorrow specify McLouth high quality sheet and strip Stainless Steel



McLOUTH STEEL CORPORATION DETROIT, MICHIGAN • MANUFACTURERS OF STAINLESS AND CARBON STEELS

HARDINGE
ELMIRA, N.Y.

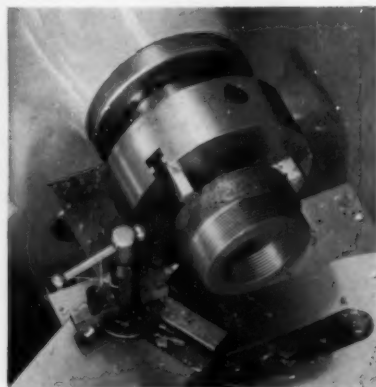
"The Outstanding Tool Room Lathe"



Precision Collet work for all sizes to 1-1/16" Collet seats *directly* in spindle.



Precision Step Chucks for diameters up to 6". Provides Collet-like accuracy.

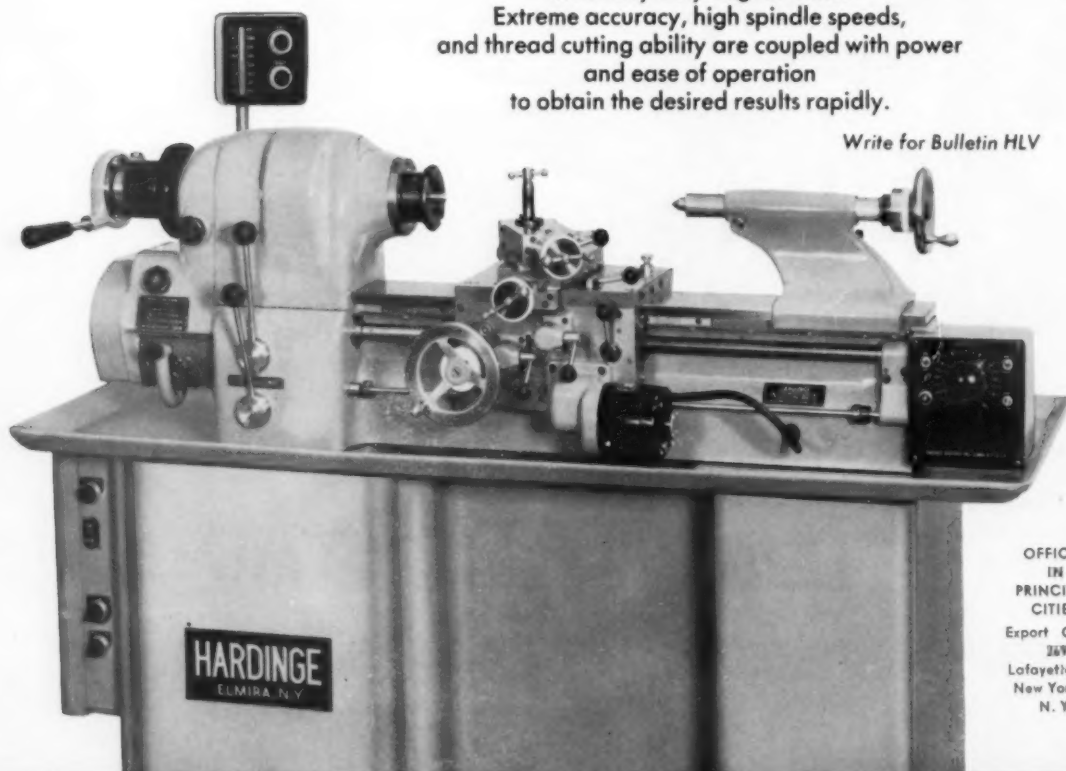


Integral Mount Jaw Chucks for precision holding of regular or irregular shapes up to 5".

Hardinge Model HLV 10" Lathe was primarily designed to fill a very old existent gap between the plain precision bench lathe and the heavy duty engine lathe.

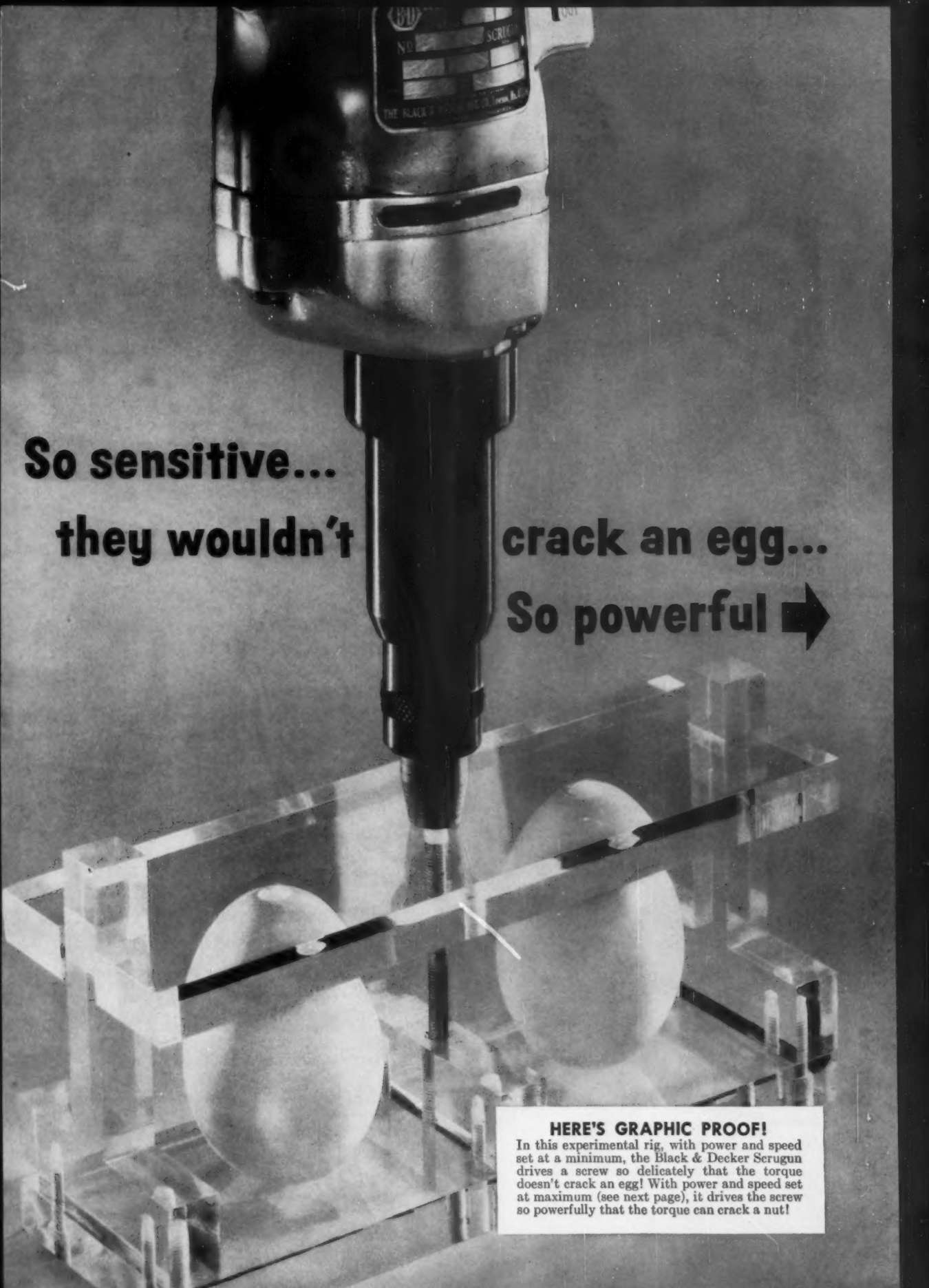
Extreme accuracy, high spindle speeds, and thread cutting ability are coupled with power and ease of operation to obtain the desired results rapidly.

Write for Bulletin HLV



OFFICES
IN
PRINCIPAL
CITIES.
Export Office:
369
Lafayette St.,
New York 12,
N. Y.

HARDINGE BROTHERS, INC., ELMIRA, N. Y.



**So sensitive...
they wouldn't**

**crack an egg...
So powerful ➡**

HERE'S GRAPHIC PROOF!

In this experimental rig, with power and speed set at a minimum, the Black & Decker Scrugun drives a screw so delicately that the torque doesn't crack an egg! With power and speed set at maximum (see next page), it drives the screw so powerfully that the torque can crack a nut!

**...they
could
crack a nut!**

NOW Black precise control

**New "Power-Speed Control" lets
you choose the correct speed and
tension—from finger-lightness to
wrench-tightness!**

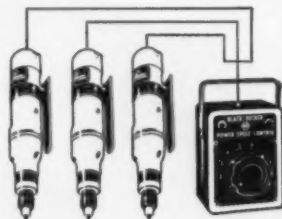
The big news in production-line assembly is the improved line of Black & Decker Scruguns! Now, with new "Power-Speed Control," they bring all the advantages of controlled electric power to every screwdriving application!

They drive machine screws ranging from No. 0 to $\frac{1}{4}$ " in all materials. You choose the precise torque you want—from 1 in. lb. to 145 in. lbs. You choose the precise speed you want—from 500 to 3000 rpm.—an infinite number of speeds for each torque adjustment. And operation is quieter, cooler, cleaner, with one-hand control.

Operating and maintenance costs drop. Armatures, bits and brushes last longer. Installation is quick and inexpensive—just plug it in and go!

Black & Decker gives you a choice of 56 models—*power-built to last!* Regardless of your application, or the type of driver you are now using, you can't afford to miss a free demonstration. See your Black & Decker distributor today or write: The BLACK & DECKER MFG. CO., Dept. 7810, Towson 4, Maryland.

**B&D
"Power -
Speed
Control"**



Unit handles as many as three adjustable clutch Scruguns. Reduces costs and increases life of tool. Rates at 5 amperes. Unlimited life.

Look in the Yellow Pages under "Tools-Electric" for Nearest Distributor.



Black &
Portable electric tools . . .

& Decker **SCRUGUNS**[®] provide impossible with other power drivers!



56 MODELS TO CHOOSE FROM

No. 8 Scrugun:

Lightest, most compact tool for driving up to No. 8 screws. Handles up to No. 8 machine screws and nuts, up to No. 8 self-tapping screws and up to No. 8 x 1 1/4" wood screws.

New, Advanced No. 10 Scruguns

Single adjustable clutch and reversing switch permit close-quarter work and reduce weight. Drives up to No. 10 x 2" wood screws, up to No. 12 self-tapping screws, and up to 1/4" diameter machine screws and nuts. Available as pistol grip handle model with "piggy-back" reversing switch . . . or center-drive model with paddle switch—with positive clutch available on both models.

No. 12 Scrugun:

Pistol-grip handle. Exclusive "piggy-back" reversing switch. Drives up to No. 12 x 2" wood screws, up to 1/4" self-tapping screws, up to 3/8" x 2" lag screws, and up to 1/4" diameter machine screws and nuts. Available with positive or adjustable clutches.

3 TYPES OF CLUTCHES!

Black & Decker adjustable clutches permit tightening to screw manufacturers' specifications . . . reduce kick-back . . . lower torque . . . cut operator fatigue . . . permit uniform adjustment . . . prevent overloading.



Single Adjustable Clutch minimizes stripping, tearing, reduces burring.



Positive Clutch . . . for driving self-tapping screws, drawing down wood screws . . . wherever definite torque adjustment is unnecessary.



Double Adjustable Clutch eliminates stripping, tearing, reduces burring.

Decker[®]
power-built to last!



Lapointe Machine Tool Company, Hudson, Massachusetts

FIRST OF ITS KIND IN THE WORLD!

... And It's Lubricated by Cities Service Pacemaker 400 T Oil!

LAPOINTE MACHINE TOOL COMPANY, originator of the broaching method of cutting metal over 50 years ago, has now originated the first vertical broaching machine with variable speed electro-mechanical drive.

Purpose of the huge, gear-driven machine is to increase tool life up to 500% through smoother operation, thus saving down time and producing more accurate work.

Selection of a lubricant for the new machine was of special importance because of the tremendous pressures it develops: normally 30,000 pounds, sometimes up to 60,000 pounds. Of the many brands of lubricants Lapointe tested, Cities Service Pacemaker 400 T had the necessary requirements for the job... so naturally, this superior lubricant got the job.

"We test the machines with Pacemaker 400 T at the factory and then put it in again when the broaches are assembled at the buyer's plant," says Lapointe. "It offers all the characteristics we need: Good film strength, high viscosity index, and exceptional anti-foam and anti-oxidant qualities. Needless to say, we're pleased and impressed with this Cities Service lubricant."

Like scores of others, Lapointe has discovered the search for a proper lubricant ends at the Cities Service label. Altogether, there are hundreds of Cities Service

products for the exacting needs of industry. For more information, talk with your nearby Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

Quick Facts About New Broaching Machine

USES: Now used for broaching aircraft engine turbine buckets, but can be adapted to general broaching.

ADVANTAGES: Increases tool life 400-500% through smoother operation, less down time. Produces more accurate work. Variable cutting speed: 12 to 75 FPM. Available in single or double ram models with 72" to 100" stroke.

Quick Facts About Pacemaker 400 T Oil

USES: Propulsion turbine units where oil is circulated under heavy pressure. Widely used in naval and commercial vessels, high speed industrial machinery.

ADVANTAGES: High viscosity index, excellent heat resistance and film strength. Chemically fortified against oxidation, rust, and foaming.

CITIES SERVICE
QUALITY PETROLEUM PRODUCTS



ARC FURNACE TRANSFORMERS
FOR UNINTERRUPTED PRODUCTION

G-E transformers keep your furnaces on the job

HERE'S WHY:

TREMENDOUS AND FREQUENT current surges during the meltdown period subject the windings and core clamps of furnace transformers to severe pounding stresses found in no other transformer application. The low-voltage bar-lead structure may also be subjected to forces more than 1000 times those encountered in normal power-transformer operation. General Electric Arc-Furnace Transformers are designed and built especially for this rugged service.

INHERENTLY STRONGER. Circular-concentric windings, used in all G-E transformers, are inherently stronger than other designs. A circular coil is far better able to withstand radial stress (the kind imposed by current surges), than a coil of any other shape. These coils are kept in place by a sturdy clamping structure, to prevent any shifting or deformation which could lead to failure.

GREATER STRENGTH is only one of many reasons why you should specify G-E transformers for your next arc-furnace installation. Others include: better cooling for more accurate control of hotspots, and a superior tap changer which has proved itself by a record of no contact-tip failures in over eighteen years.

For the full story, contact your nearest G-E Apparatus Sales Office or write to General Electric Company, Section 422-28, Schenectady 5, N. Y.

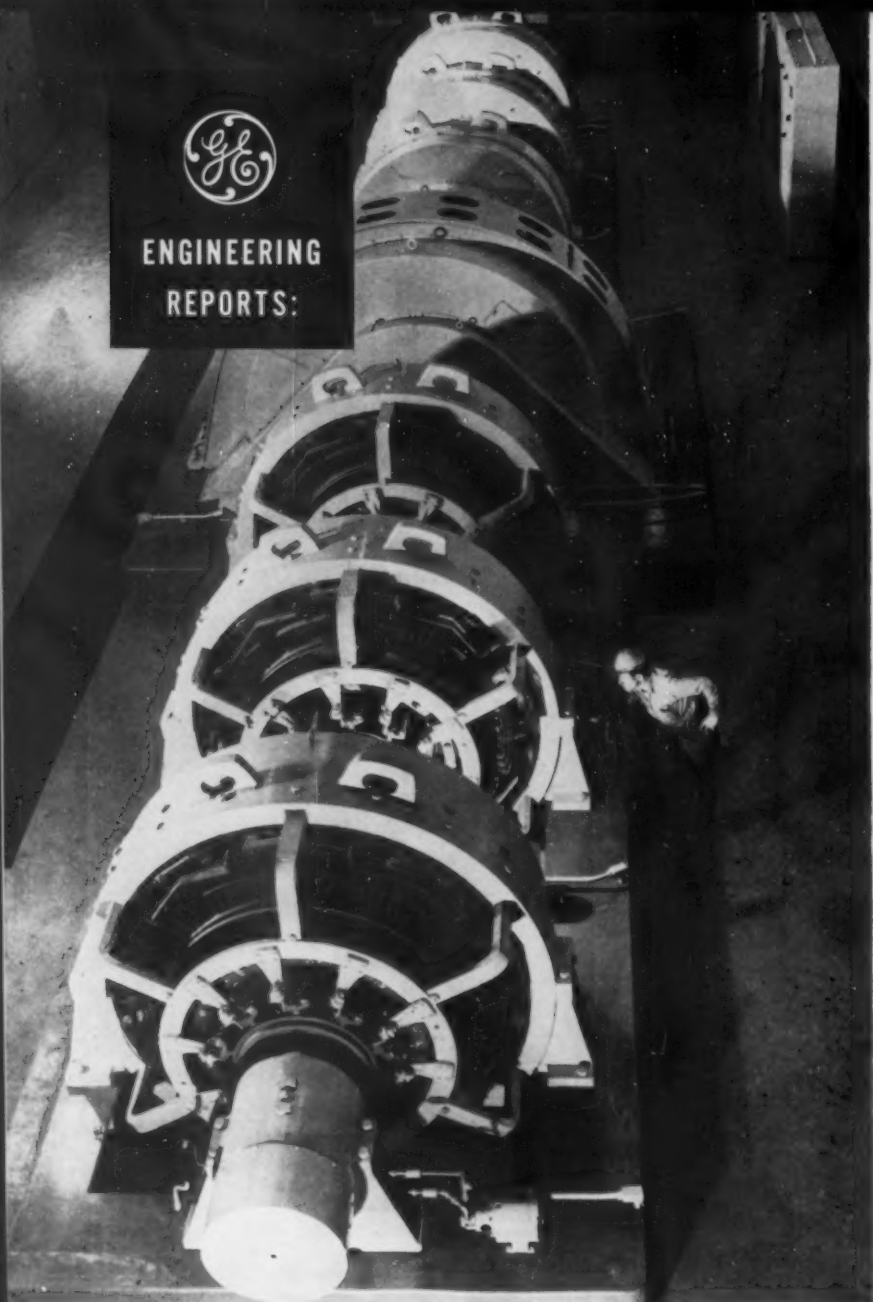
Progress Is Our Most Important Product

GENERAL  ELECTRIC

MORE DEPENDABLE TRANSFORMERS:
Core-type construction with circular-concentric windings makes G-E transformers best able to withstand the innumerable jolting forces encountered in arc-furnace operation.

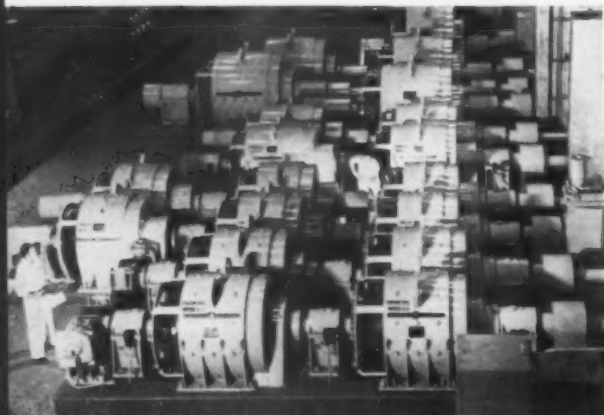


ENGINEERING REPORTS:



SUPPLYING POWER for stands 3 and 5, and tension reel, one of two huge G-E motor-generator sets has 15,000-hp synchronous motor and six duplicate 2000-kw generators.

FAST acceleration, balanced speed regulation are obtained using specially designed, low inertia, d-c drive motors, designed to fit mill's rigid space requirements.

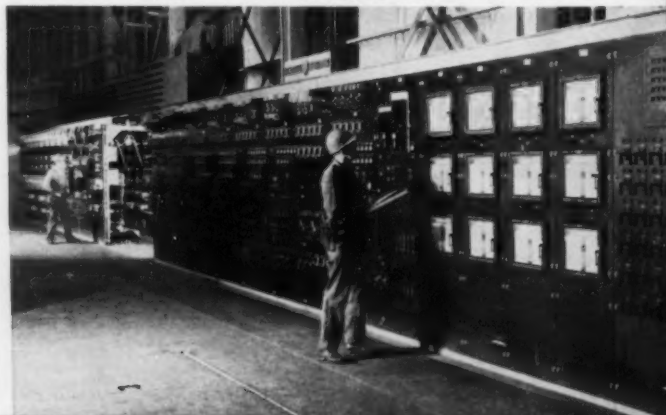


AUTOMATIC THICKNESS CONTROL system includes stand 1 X-ray indicator (left), X-ray gage (center). Operator's control cabinet is shown at right.



CLOSER TOLERANCES at higher speeds are obtained with thickness control system. Gage control panel shown above.

ACCURATE system control is provided by main-drive d-c control equipment. Designed by G.E. for cold mills, panel includes memory fault finder, magnetic and rotating amplifier regulating circuitry.





CHIEF OPERATOR'S control is located at stand 3, speed control at stand 5, on new 5-stand tandem cold strip mill.

At Weirton Steel: 28,000 hp Drives World's Most Powerful Cold Strip Mill

General Electric X-ray controlled cold mill drive system is world's fastest

National Steel Corporation's Division, Weirton Steel Company, Weirton, West Virginia, recently started up their new 5-stand tandem cold mill with a General Electric d-c drive system containing the world's greatest concentration of cold mill drive horsepower. With the new General Electric automatic X-ray gage control system, Weirton Steel Company's cold mill is another significant example of automatic production providing higher quality steel, with closer tolerances, at higher rolling speeds.

THE AUTOMATIC GAGE control system, one of the newest General Electric developments for the steel industry, has two basic elements: (1) a coarse regulating system to correct errors by means of the stand 1 screwdown motors, with the X-ray gage measuring stand 1 steel thickness; and (2) a vernier system controlling stand 5 drive motor speed, with the X-ray gage measuring finished strip thickness. Some of the highlights of the drive and control system are shown on these pages.

FROM INITIAL PLANNING, General Electric engineers worked closely with Weirton personnel and the United Engineering and Foundry Co. to help design, install and start up this engineered system that helps Weirton meet increased steel production requirements. Get complete information on the latest General Electric equipment and methods from your Apparatus Sales Representative at the nearest General Electric Apparatus Sales Office, early in your planning. 659-113

Engineered Electrical Systems for the Steel Industry

GENERAL  **ELECTRIC**

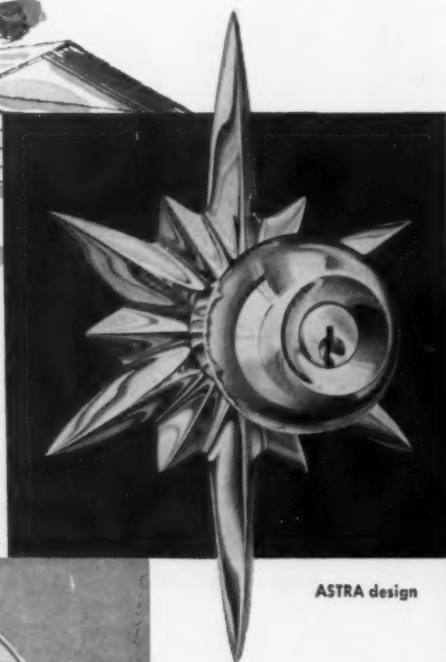
MUELLER BRASS CO.

brass and bronze forgings help insure
dependability and lasting jewel-like
finish of distinctive **SCHLAGE** locks

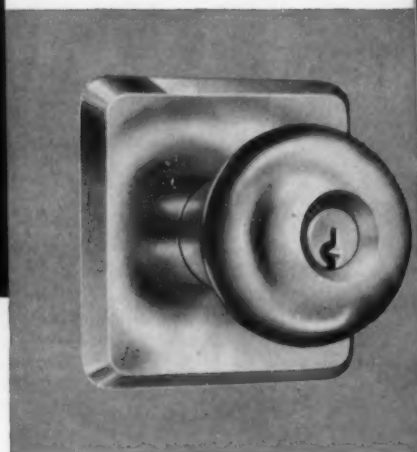
Smart styling, handsome appearance and durability have been neatly combined by the Schlage Lock Company of San Francisco in their line of lock designs for residential and commercial use. Many important parts of these lock sets are brass and bronze forgings made by the Mueller Brass Co. The beautiful natural color, corrosion resistance, and inherent dependability of these forgings make them ideal for this purpose. In addition, the high degree of surface smoothness makes possible an exceptionally lustrous finish as well as a perfect plating surface when required. Then, too, the use of forgings has reduced costs, cut finishing time and greatly re-

duced the number of rejects when compared to the sand castings that were formerly used.

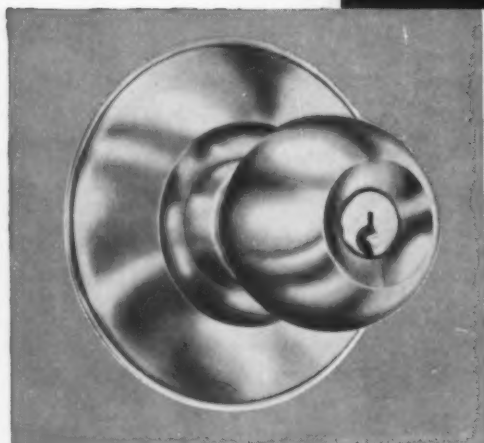
Whether you manufacture decorative hardware where finish is of prime importance or rugged assemblies that must stand up to bruising everyday punishment, it will pay you to investigate Mueller Brass Co. forgings. Strong, long wearing brass, bronze or aluminum parts, forged to your exact specifications under exacting statistical quality control standards can help you reduce costs, improve performance, and give you a better looking product. Write for our engineering manual (No. H-58565) . . . or call in one of our engineers to investigate possible forging applications in your products.



ASTRA design



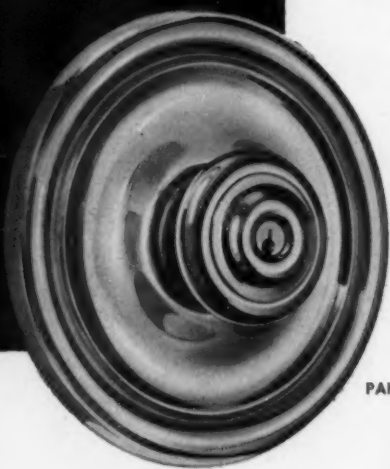
MONARCH design



MERCURY design



WAVERLY design



PANTHEON design

• WRITE TODAY FOR THE ENGINEERING MANUAL YOU NEED



- | | |
|---|--------------------------|
| Mueller Brass Co. Forgings
Engineering Manual H-58565 | <input type="checkbox"/> |
| Tuf Stuf Aluminum Bronze Alloys
Engineering Manual H-58563 | <input type="checkbox"/> |
| 600 Series Bearing Alloys
Engineering Manual FM-3000 | <input type="checkbox"/> |
| Copper Base Alloys in Rod Form
Engineering Manual FM-3010 | <input type="checkbox"/> |

**METALS
AND ALLOYS
REVIEW**



by **FRANK M. LEVY**
Vice-President and Director of Research

Last week one of our sales engineers was at the home office and we were talking about one of his customers in the East who manufactures milling machines which are being used for milling aircraft spars. We are supplying gibs, slide bars and wear strips to this company made of our "600" series bearing metal in rectangular rod form. The material formerly used was aluminum bronze* cast bars which they could only obtain in 36" lengths. Their engineering department estimates that costs have been reduced 50% on this component. Machining time has been reduced and impregnation of porous castings has been eliminated.

Our sales representative was curious about my experience with "600" in other applications such as this. Oddly enough, our own plant has been a pretty good proving ground. In our extrusion department, for example, we have gotten exceptionally good service from slides made of "600" and used on the die heads which are subject to pressure and extremely rough usage.

Bob Irwin of our forging department reports that the "600" strips he has used for lining the ways of our big forging presses have proved far superior to the bronzes which were original equipment. The bronze strips squashed out after protracted running. More important, the "600" strips last 10 times longer before replacement is necessary.

In our copper tube fabricating department we have a lot of automatic equipment for the production of formed tube shapes like tees and ells used in the plumbing industry. On one of the tube benders, there was no provision made for replacing worn forming slides. Our Maintenance Department reworked the machine using "600" strips as replaceable forming slide inserts. The bender is now a far more efficient machine. Because of the long life of "600", downtime on this machine has been practically eliminated.

While we were talking about these uses in our own plant, it brought to mind some other instances where the exceptionally good wearing properties of "600" have been established. A Cincinnati lathe manufacturer uses "600" in the form of counter sunk hex-headed screws on wearing strips used on lathe carriages. When the strip wears to the retaining screw the ways will not be scratched.

According to their own records, all other materials which they had tested proved unsatisfactory for the job. Another maker of precision lathes and milling machines found that after a year of exhaustive tests, the "600" metal that was used as nuts on compound slide screws outlasted competitive metals at an approximate ratio of 3 to 1 at an estimated saving of 30%.

Sliding surfaces on all kinds of machinery have different wear characteristics, as you have undoubtedly found. If you have any problems involving gibs, slide bars or wear strips that are proving troublesome, why not drop me a line or send a part print and we'll be glad to study it and make the proper recommendations.

*We manufacture 4 grades of wrought aluminum bronze.

MUELLER BRASS CO.
PORT HURON 24, MICHIGAN



You Get

MORE

...because

ALLIS-CHALMERS

"COORDINEERS"

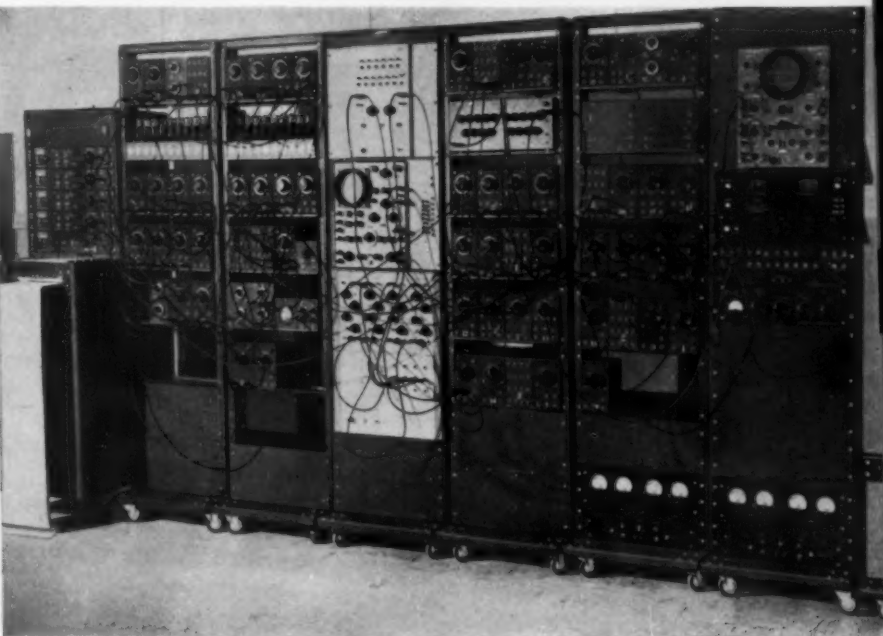
the Entire System

EFFECTIVE regulation is more than a matter of good regulator design. It embraces overall system design... the integration of interdependent components — generators, exciters, motors, regulators and other control equipment. As manufacturers of a most diversified line of electrical generation, distribution and utilization equipment, Allis-Chalmers, of course, is in a unique position to provide this practical approach to mill regulation.

Allis-Chalmers maintains separate departments, staffed by research, design, manufacturing and application specialists for each product. "Coordineering" results from an interdepartment exchange of ideas and technical information correlated in one department specializing in metal producing industry application. In this department, components are matched to meet the requirements of your job. Responsibility for system performance rests with one company.

Analytical Facilities Utilized...

System performance is simulated in the computers to get optimum configuration of components. Time constants and exciter coilings necessary for desired response are established.



Regulex is an Allis-Chalmers trademark.

ALLIS-

THE IRON AGE

Efficient Regulation

ALLIS-CHALMERS

Regulators

For MILL CONTROL

Three Types Available

1 REGULEX Rotating Amplifier
— Applicable where high power levels for reversible output are desired.

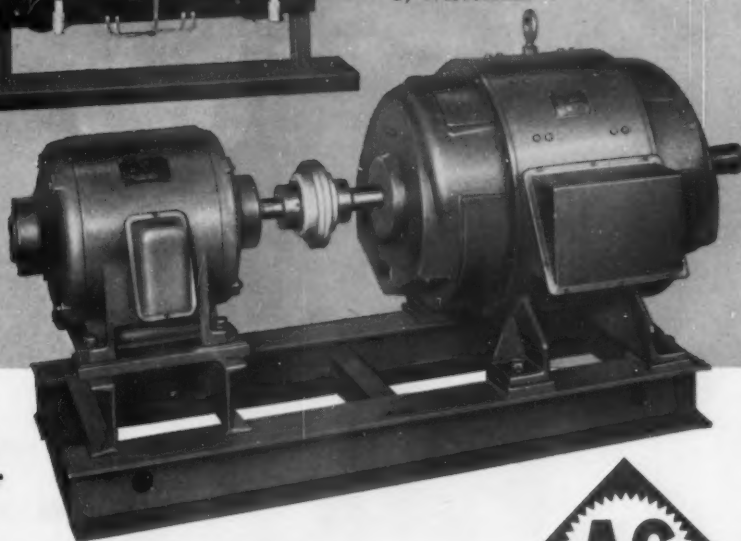
2 Magnetic Amplifiers — Applicable where low power levels for reversing or high power levels for non-reversing are desired.

3 Combinations of Rotating and Magnetic Amplifiers
— Each complements the other for maximum regulating efficiency.

Get all the facts. See your Allis-Chalmers representative or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

Magnetic Amplifiers

Regulex Rotating Amplifier



CHALMERS

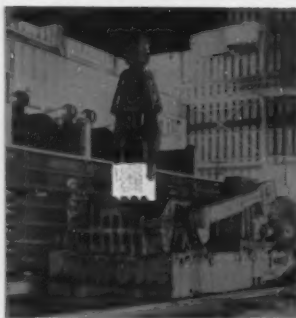
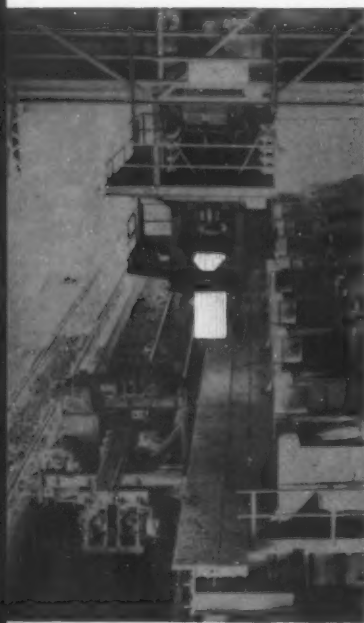


A-5030

October 18, 1956

27

READY



SURFACE COMBUSTION CORPORATION, 2406 DORR ST., TOLEDO 1, OHIO

TO ROLL.

**New batteries of Surface® one-way fired
soaking pits go into operation in Texas, where
men make big investments and expect big returns**

Associated Companies:

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Stein & Atkinson, Ltd., London • Stein & Roubaix, Paris

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Benno Schilde Maschinenbau, A. G., Bad Hersfeld



You can build it better



BUILT TO LAST. Light in weight, strong and tough, highly resistant to corrosion and abrasion, the 40-ft. hull of this attractive houseboat, built of 12-ga. USS COR-TEN Steel, has what it takes to give long years of low-maintenance, trouble-free service. Customarily beached by being run right up on the shore, this boat needs COR-TEN Steel's superior strength and high resistance to wear and impact to withstand such rough usage. Says the owner, "Despite the fact that on five different occasions the boat has been dropped from the dry-dock from heights ranging from 6 to 12 feet—treatment that would have completely wrecked a boat of usual construction—the 5½-year-old hull is still in excellent condition and ap-

pears good for many, many more years." (This all-steel boat was constructed by Kelly Shop, Inc., Jeffersonville, Ind.)

USS COR-TEN Steel has been approved by the American Bureau of Shipping for use in hull construction, either riveted or welded, with a general reduction from mild steel weights or sections of about 10 per cent. Lloyds Register of Shipping has stated that COR-TEN Steel is acceptable under its rules as a special quality steel for ship building. Its use in oil tankers, ore boats, dredges, barges and pleasure craft, both in fresh and salt water service during the past 23 years, has definitely proved USS COR-TEN Steel's exceptional fitness for marine construction.

with USS High Strength Steels

IN USS HIGH STRENGTH STEELS, design engineers have at their command three service-tested steels that will permit them to materially increase the efficiency and economy of machinery, equipment and structures at little or no increase in first cost . . . and frequently at less cost.

All three of these famous "steels that do more"—USS COR-TEN, USS MAN-TEN and USS TRI-TEN "E"—have a 50% higher yield point than plain carbon steel. All have better atmospheric corrosion resistance and offer greater resistance to wear, fatigue and impact. Each, however, has specific superior properties that should be considered in determining its selection.

USS COR-TEN Steel, for example, is distinguished by its superior resistance to atmospheric corrosion—4 to 6 times that of carbon steel. USS MAN-TEN Steel is intended for weight reduction by means of greater strength in moderate forming applications, with enhanced re-

sistance to abrasion and atmospheric corrosion. USS TRI-TEN "E" Steel's outstanding characteristics are excellent weldability and resistance to shock.

Used singly or in combination, these steels can advantageously replace carbon steel to increase the strength and durability of vital parts *without* increasing their weight. Or when the use of thinner sections is feasible, they can (1) reduce equipment weight without reducing its strength, or (2) increase the size and capacity of equipment without increasing total weight or the power required to move it.

You will find our 174-page "Design Manual for High Strength Steels" extremely useful in applying the benefits of these steels to your product. Send for free copy—simply write on your company letterhead to United States Steel Corporation, Room 2801, 525 William Penn Place, Pittsburgh 30, Pa.



"PREGNANT PLATYPUS." That's what the designers call this new combination trailer made to carry two completely unrelated types of products. Going in one direction it hauls 800 gals. of glue in the "dromedary" tank and 4,000 gals. in the belly tank below the trailer. On the return trip it carries 42,000 lbs. of plywood in the trailer van. To reduce empty weight and obtain greater strength—and at the same time to provide resistance to the mildly corrosive glue carried—USS COR-TEN Steel was used in both tanks and in the trailer frame, body framing and cross frame members as well. As a result, the unit weighs 1,800 lbs. (11½%) less than if mild steel had been used, and will carry maximum payload, require less maintenance and last longer. Built by Peerless Trailer and Truck Service, Portland, Ore., for M and M Wood Working Company.



TO BEAT HEAT AND ABRASION. This asphalt mixing plant produces tar or asphalt road-paving mixes at a rate of more than 60 tons per hour. In the dryer, which removes the moisture from the sand and stone in the aggregate, temperatures run as high as 800° F. Abrasive action is severe.

To meet these conditions the Barber-Greene Co. of Aurora, Ill., builds the entire dryer drum (circle) of USS MAN-TEN Steel. In this way they obtain one and a half times greater yield point than with carbon steel, greater abrasion resistance, and greater resistance to heat, impact and vibration. These qualities pay off by keeping the equipment more continuously on the job.

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • NATIONAL TUBE DIVISION, PITTSBURGH
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS HIGH STRENGTH STEELS

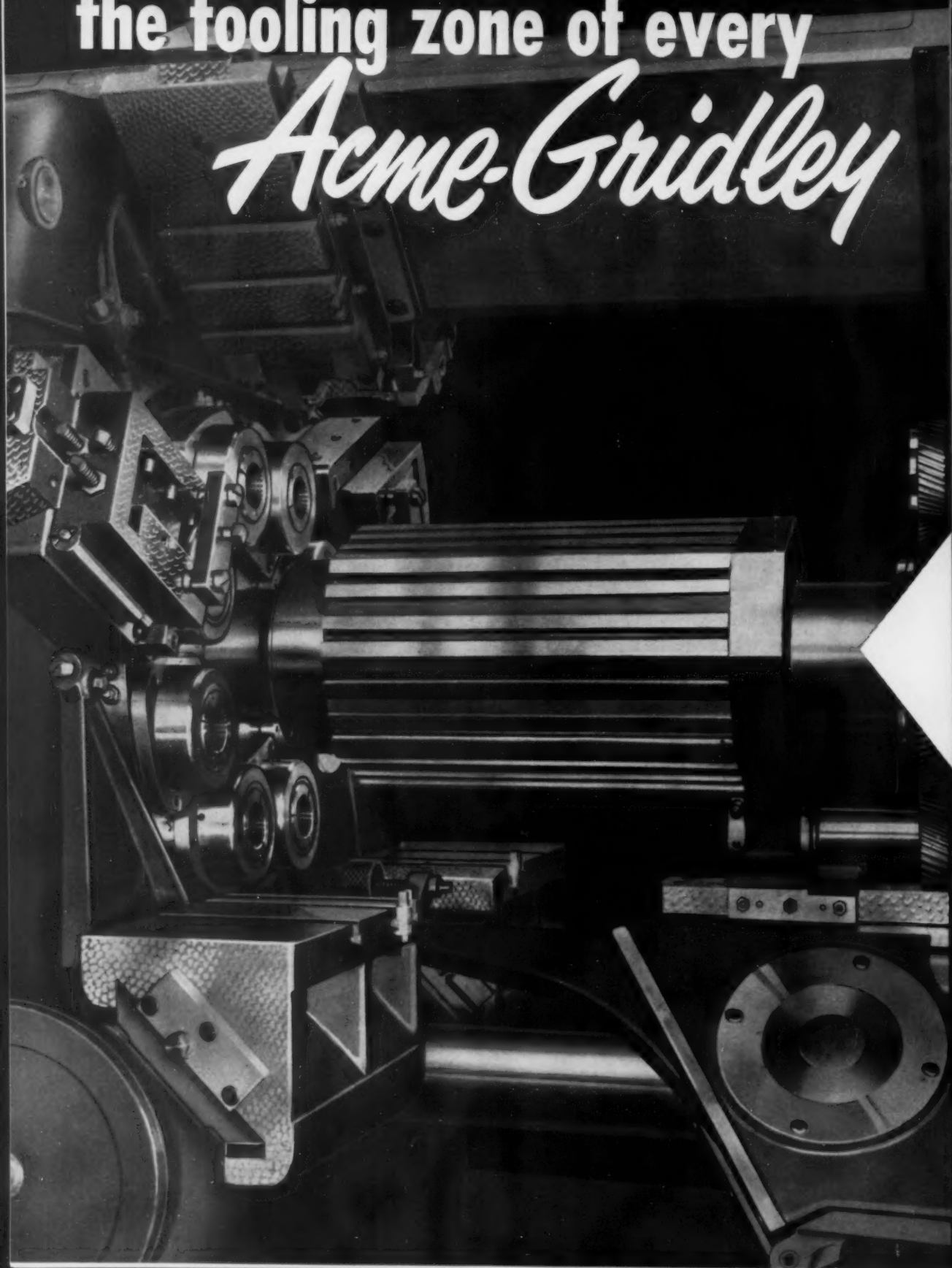
USS MAN-TEN • USS COR-TEN • USS TRI-TEN



UNITED STATES STEEL

the tooling zone of every

Acme-Gridley



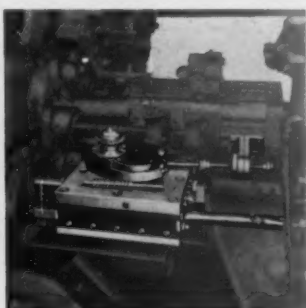
- open... for business!

Since the primary advantage of a multiple-spindle automatic is to make it possible to complete more operations in a single setup, accessibility to and plenty of space in the tooling zone, to apply the maximum number of tools, is especially significant.

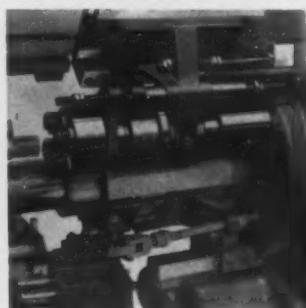
When you want to speed up production, perform unusual operations, or to get a finer finish, let a National Acme tooling engineer apply his COMPLETE LINE experience in helping you select the attachments to perform these operations on your machine.



Combination Cross Milling and Drilling Attachment



Worm or Thread Generating Device



Threading or Tapping Tool

LET US TELL YOU MORE ABOUT *Acme-Gridley* BASIC DESIGN

This is but one of many BASIC DESIGN features which are responsible for Acme-Gridley's outstanding performance records. May we send you additional information? Or, better yet, let us send a representative to discuss possible production short cuts with you.

National Acme

THE NATIONAL ACME COMPANY, 175 EAST 131ST STREET, CLEVELAND 8, OHIO

SALES OFFICES:

Newark, N. J.

Chicago, Ill.

Detroit, Mich.

PRODUCT DATA SHEET		
Kaiser Periclase Chrome Brick		
1. CHEMICAL ANALYSIS: (Typical)		
Loss on Ignition	Chemically Bonded 3.7%	Burned 0.0%
CaO	1.0	1.0
SiO ₂	8.4	8.7
Cr ₂ O ₃	9.1	9.4
Fe ₂ O ₃	4.5	4.7
Al ₂ O ₃	7.9	8.2
MgO (by difference)	65.4	68.0
	100.0	100.0
2. PHYSICAL PROPERTIES: (Typical)		
REFRACTORYNESS	3090°F	3090°F
Hot Load Test (shear Temp. @ 25 lbs./sq. in.)	**	3-5%
Deformation, @ 25 lbs./sq. in., 1/2 hr. (@ 3000°F)	over 42	over 42
P.C.E. Value	**	0%
VOLUME STABILITY		
Shrinkage (no load)	**	6.25x10 ⁻⁴
Linear, % (after firing to 3000°F 5 hrs.)	**	1.7%
Linear Coefficient of Reversible Expansion (in./in./°F) (80-2730°F)		
Reversible Thermal Expansion @ 2730°F	7.5%	20.5%
POROSITY		
Apparent	187	179
True	12.9	12.6
DENSITY		
Bulk, lbs./cu. ft.	9.000	5.000
Avg. Wt. of 9"x4 1/2"x3" Straight, lbs.	**	0.264
STRENGTH		
Crushing Strength, lbs./sq. in.	**	0.264
MEAN SPECIFIC HEAT (83-1830°F) (Btu/lb./°F)		

* Figure not constant over temperature range.
 ** No value applicable. Brick becomes burned in test.

COMPARE THESE SPECIFICATIONS

Here's proof that Kaiser Periclase Chrome Brick can give you the longest and most economical end wall service available today!

One quick comparison between the specifications above and those of any other end wall brick will tell you why open hearth operators all over the country specify Kaiser Periclase Chrome Brick:

1. Greatly increases end wall life when needed, or
2. Cuts costs with thinner walls, when end wall service is balanced.

This is because the **PATENTED** composition of

Kaiser Periclase Chrome Brick assures you of less spalling, less swelling, greater resistance to abrasion and alteration by oxide and slag...

Let your Kaiser Chemicals sales engineer explain how you can take full advantage of Kaiser Periclase Chrome Brick in your open hearth. Contact the nearest sales office listed at right for immediate attention to your particular problem.



TO THOSE OF ANY OTHER END WALL BRICK!

More reasons why Kaiser Periclase Chrome Brick gives you better service:

1. Chromite content is the minimum amount (only 9.1% Cr_2O_3) necessary to provide thermal shock resistance. Lowering of chromite reduces swelling, thus minimizes end wall buckling.

2. A ceramic bond is formed *before* the chemical bond is destroyed.

3. No liquid phase in forming its ceramic bond. Volume stable.

4. Highest MgO content in end

wall brick provides greater resistance to carryover erosion and iron oxide attack.

5. Lowest porosity minimizes alteration by resisting penetration of gases and impurities.

For more information call our nearest Sales Office: Kaiser Chemicals Division, 1924 Broadway, OAKLAND 12, Calif. . . . 3 Gateway Center, PITTSBURGH 22, Pa. . . . 518 Calumet Bldg., 5231 Hohman Avenue, HAMMOND, Indiana.

To obtain free copies of Kaiser Chemicals product literature write Kaiser Aluminum & Chemical Sales, Inc., 1924 Broadway, OAKLAND 12, California, Dept. S6222.

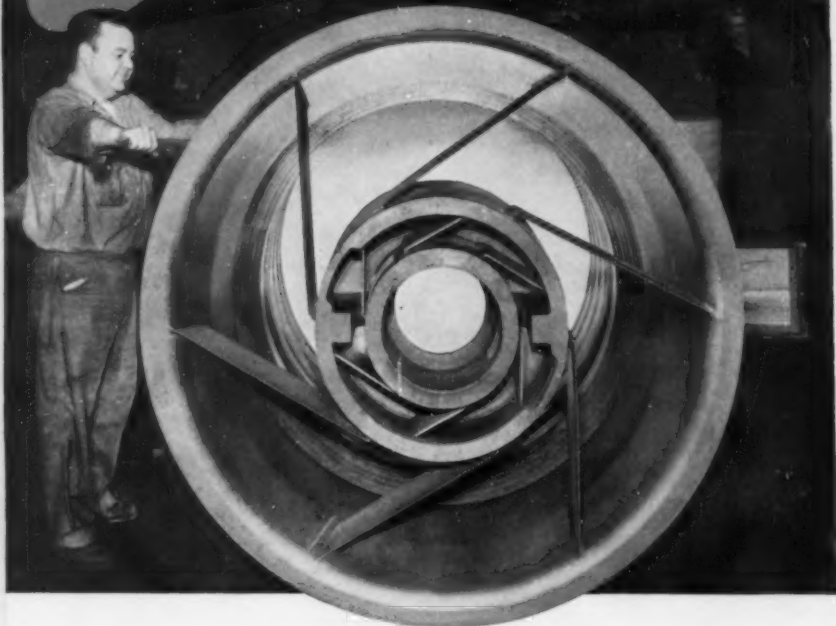
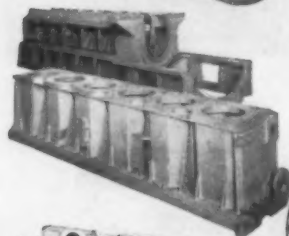
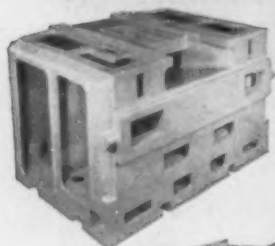
Kaiser Chemicals

Pioneers in modern basic refractories

REFRACTORY BRICK AND RAMMING MATERIALS • CASTABLES & MORTARS • MAGNESITE • PERICLASE • DEADBURNED DOLOMITE

October 18, 1956

Steel-Weld FABRICATION



Use **WELDED STEEL**
for Greater Strength
with Less Weight!



Gas Turbine Components are also produced in welded steel. The turbine cylinder housing for a Westinghouse Industrial Gas Turbine, shown above, and the parts and assemblies illustrated at the left, will give you a comprehensive picture of Mahon capabilities and facilities . . . assets which enable the Mahon Company to produce virtually any heavy part or assembly in welded steel at lower cost. This is particularly true in short run production programs where the manifold advantages and economies of weldments are most fully realized. If you require parts or assemblies for processing machinery, machine tools, or any other type of heavy mechanical equipment, you can call on Mahon with complete confidence. You will find in the Mahon organization a unique source for welded steel in any form . . . a source with long experience and complete facilities for design engineering, fabricating, machining and assembling . . . a source where design skill and advanced fabricating techniques are supplemented by craftsmanship which assures you a finer appearing product embodying every advantage of Steel-Weld Fabrication. See Sweet's Product Design File for information, or have a Mahon sales engineer call at your convenience.

THE R. C. MAHON COMPANY • Detroit 34; Michigan
Sales-Engineering Offices in Detroit, New York and Chicago

Engineers and Fabricators of Steel in Any Form for Any Purpose

MAHON

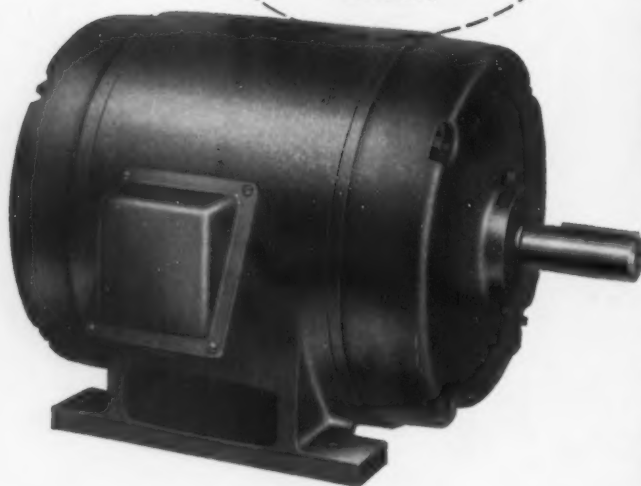
faster

Royal Blue
has won acceptance *faster*
than any other wire rope
in Roebling history



John A. Roebling's Sons Corporation, Trenton 2, N. J., Subsidiary of The Colorado Fuel and Iron Corporation BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 2340 GLENDALE-MILFORD RD., EVENDALE • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6316 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • PITTSBURGH, 1723 HENRY W. OLIVER BLDG. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 221 N. CHEYENNE ST. • EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK 6.



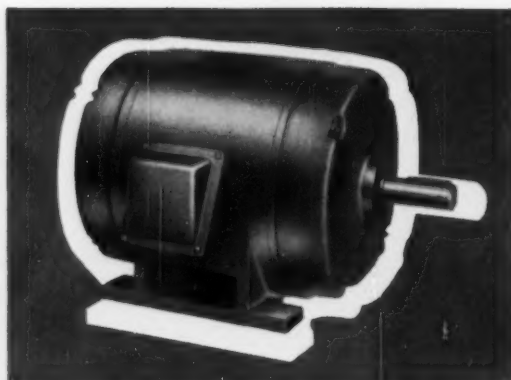


**You get better
performance with these
Wagner DP Motors**

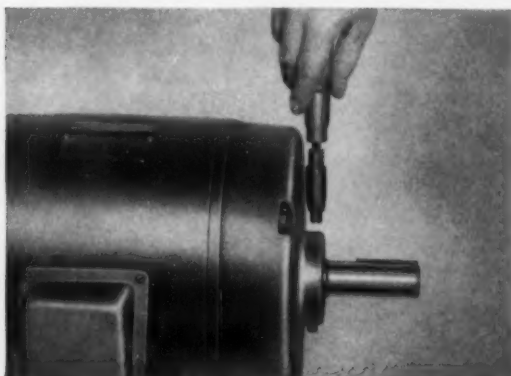
Wagner DP motors are doubly protected by (1) rugged, corrosion-resistant cast iron frames, smoothly rounded so that no moisture can collect on them. Motor feet are cast as an integral part of the frame for maximum strength and rigidity. (2) Enclosures on the DP motor are completely drip-proof—virtually splashproof. Air intakes are located at the bottom of the endplates and air outlets are located at the base of the frame—one on each side.

Although engineered to meet the re-rated NEMA specifications which call for more power in smaller frames, the same high quality and long life performance that have made Wagner Motors "the choice of leaders in industry" for many years has of course been retained.

Full information and principal dimensions are given in Bulletin MU-202. Write for your copy today.



MORE POWER IN SMALLER FRAMES The Wagner DP Motor packs more power in a smaller frame and this smaller size means ease of handling and stocking... less space required for installation.



CAN BE RE-GREASED FOR LONGER LIFE This motor will operate for years without regreasing... bearings are completely enclosed... however, provisions have been made for adding lubricant and for the removal of old grease in cases where re-greasing is necessary.



COOL RUNNING Specially designed baffles direct cooling air from the blowers through the motor and provide protection for the stator windings. Blowers are an integral part of rotor... and move large volumes of air without noise or vibration.

Wagner Electric Corporation
6403 Plymouth Ave., St. Louis 14, Mo., U.S.A.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

How **QUALITY CONTROL** Puts **HIGH-PROFIT POTENTIAL** Into **Bucyrus-Erie Cranes**



On material handling jobs all over the country, Bucyrus-Erie cranes stand out — for ease of operation, economy, and dependable, long-term service. Performance like this results from careful design, good workmanship, and use of the best materials . . . held to rigid standards by the company's own metallurgical laboratory.

Through all phases of production, this department — with a staff and equipment rivalling those of firms specializing in metal production — maintains constant control over the process. Take the production of steels, for instance.

Samples of every "beat" are subjected to physical and chemical tests whose results assist the foundry in maintaining the specified analysis of the steels. After steels have been heat treated to obtain the required strength, hardness, and toughness, a microscope is used to examine the metal structure. Only when steels conform to **ALL** specifications are they incorporated into a Bucyrus-Erie machine.

Laboratory control of foundry sands maintains uniformity of sand mixes and helps assure high-quality castings. This requires a number of processes and the use of special equipment to establish the correct permeability, flowability, green strength, moisture content, and other physical properties of foundry sands.

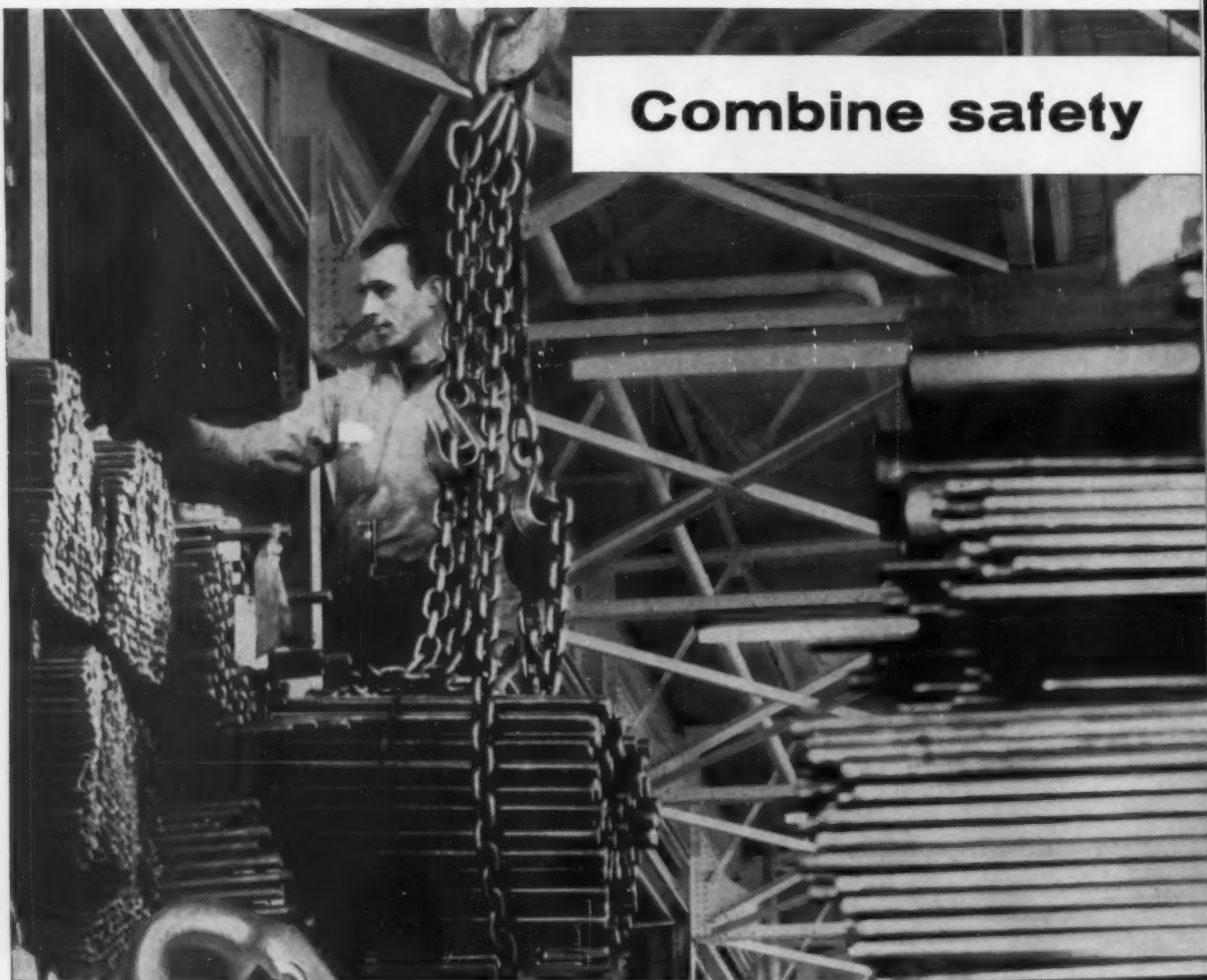
Close attention to quality is only one of the reasons why Bucyrus-Erie cranes should have a key role in your material handling program. They have a host of outstanding features that will mean lower handling costs to you. Your nearby Bucyrus-Erie distributor will be glad to talk over your material handling problems and help you select the right size crane for your requirements. Write, call, or see him soon.

255E56C



South Milwaukee, Wisconsin

Combine safety



INITIAL ASSEMBLY or REPAIR of chain slings such as that shown above is easily accomplished with Wedglok Safety Connecting Links. Inset, left, shows simplicity of Wedglok. Slip half of each link into sections being connected. Then assemble halves and drive the spacer. Peen over projecting points on spacer. Resulting link is as strong as original equipment. Disassembly is easy, too. Just burn out the spacer. Reassemble, using replacement spacer.

REPUBLIC



World's Widest Range of Standard Steels

and efficiency with REPUBLIC ALLOY STEEL CHAIN and WEDGLOK* CONNECTING LINKS

Increase service life; lower replacement costs; make safe, permanent or temporary chain product assemblies. These are a few of the many ways you can make more efficient use of Republic Alloy Steel Chain in combination with Wedglok Safety Connecting Links.

Wedglok Links are available in various sizes of five different designs. Each is as strong as comparable-size alloy chain. Each can be quickly and easily field-assembled without special equipment.

Result: you can replace a damaged link and put your chain assembly back into full service without costly delay, or unnecessary replacement of the entire unit. Or you can make new assemblies using running lengths of Republic Alloy Steel Chain with necessary accessories, without waiting for factory shipments. Use of Wedglok Links eliminates dangerous makeshift methods and questionable field welds.

Your Republic Chain Distributor has ample supplies of safe, strong Wedgloks, chain attachments, and accessories. His complete stock includes Republic Alloy Steel Chain in all types and sizes. Made from special analysis open hearth steel, quality controlled from ore to finished product, Republic Alloy Chain is safe, strong, lightweight and easy to handle. Precise heat treatment develops the highest possible tensile strength and maximum resistance to wear, shock, strain and work hardening. Stress relief or re-heat treatment is unnecessary.

Whatever your chain application, it will pay to consult your Republic Chain Distributor. His vast experience and complete stock of all chain products assure you the best combination to provide maximum safety and efficiency. Mail the coupon for further information.



EFFICIENT OPERATION of this compressor depends on maintaining a hermetic seal. Critical point is assembly of cylinder head, valve plate, gaskets and block. Republic Alloy Steel Hex Head Cap Screws clamp these components into a solid, leak-proof unit. Their high tensile strength, yield point, hardness and ductility assure a permanent seal through years of cyclic operation.



COMBINED STRENGTH and internal quality of these magazine press side frames is made possible with Chateaugay, Republic's exclusive premium Pig Iron. In addition, Chateaugay's fine grain structure provides outstanding machinability. Apply these benefits to your castings. Mail coupon to secure services of a Republic Pig Iron Metallurgist.



EFFICIENT HANDLING reduced costs 25% in this application, using Republic PB-120T Box and Skid Units. They freed valuable floor space, provided better product visibility and minimized inventory time. Republic Materials Handling Equipment includes a variety of standard boxes, pallets and skids. Or specialized designs can be furnished to meet unusual requirements.

*Patented and patents pending

STEEL

and Steel Products

REPUBLIC STEEL CORPORATION

Dept. C-2556

3104 East 45th Street, Cleveland 27, Ohio

Please send me further information on:

- | | |
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| <input type="checkbox"/> Wedglok Connecting Links | <input type="checkbox"/> Please have a Pig Iron Metallurgist call. |
| <input type="checkbox"/> Alloy Steel Cap Screws | |

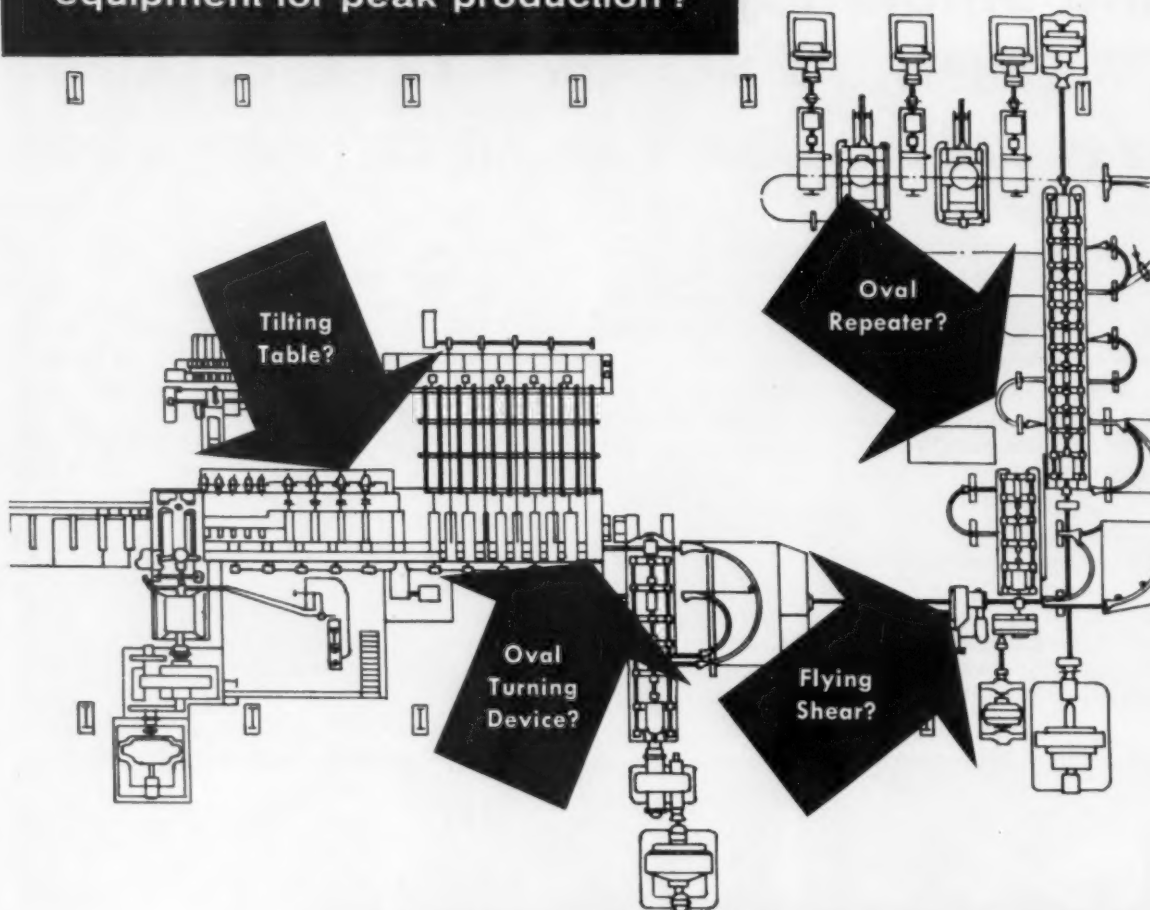
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From auxiliary units to complete
mills, look to **BIRDSBORO** for
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Weldments "CAST-WELD" Design
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For 59 examples of the latest
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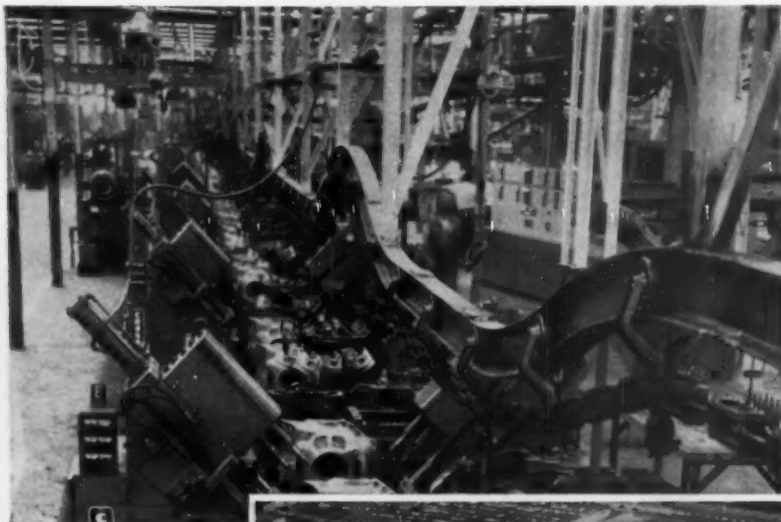
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New York Office: Engineering Supervision Co., 120 West 42nd Street, New York 36, N.Y.

In the Spectacular **PLYMOUTH** ENGINE PLANT you see



(Above) View of Plymouth
Engine assembly line



VICKERS®
HYDRAULICS
*Wherever
You Look*

Plymouth Engine Plant is 980' long and 500' wide. Indicative of its scope is crankshaft machining requiring 4500 linear feet of automation composed of 385 individual units. Plant capacity is 150 engines per hour.

In the new Plymouth "Qualimatic" Engine plant you see Vickers Hydraulics on every side. Hundreds of machines in this latest and greatest example of automation are Vickers equipped.

Both builders and users of production equipment appreciate the significant advantages of Vickers Hydraulics . . . advantages that help produce better products at lower cost.

A specific need in the Engine Plant is standardization on a few basic hydraulic units to keep down parts inventories. The Vickers line makes standardization easy. Also desirable are hydraulics in units quickly demountable . . . so that by replacing units, repairs on the job are avoided and costly downtime reduced. Vickers has extensively developed demountable unit construction.

Whether automated or not, more and more plants have more and more Vickers Hydraulics. For further information, write for Catalog 5002B.

VICKERS HYDRAULICS is used on machines supplied by these Companies to Plymouth Engine Plant

American Broach & Machine Co.	Lees-Brodner Company
Barnes Drill Company	Michigan Drill Head Co.
Bilt-Rite Tool & Machine Co.	Micromatic Hone Corporation
Bohr Machine Tool Company	Micro-Poise Engineering & Sales Co.
Colonial Broach & Machine Co.	Modern Industrial Engineering Co.
Crankshaft Machine Company	The Match & Merryweather Machinery Co.
The Cross Company	Morton Company
Ex-Coil-O Corporation	A. P. Schraner Co.
Fitchburg Engineering Corp.	The Sheffield Corporation
Greenlee Bros. & Company	Snyder Tool & Engineering Co.
Industrial Metal Products	Sundstrand Machine Tool Co.
The LaPointe Machine Tool Co.	Jervis B. Webb Co.
Landis Tool Company	The Wickes Corp.
The R. K. LeBlond Machine Tool Co.	Wilson Automation Co.

VICKERS INCORPORATED

DIVISION OF SPERRY RAND CORPORATION

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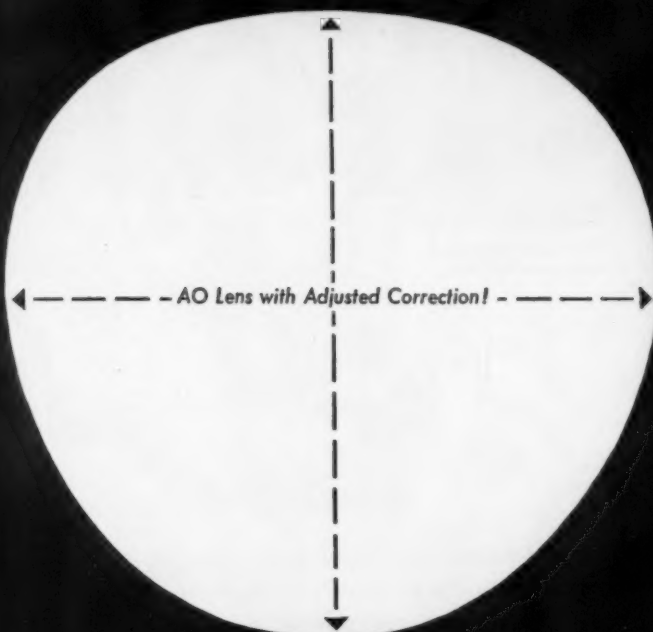
Now Another *Balanced Vision in*

Now . . . American Optical is proud to announce an outstanding development in vision and safety . . . **CLEAR AND CALOBAR CORRECTIVE CURVE SUPER ARMORPLATE TILLYER LENSES.**

AO ULTRASCOPIC Safety Glasses with BALANCED VISION are the Ultimate in Eye Protection

There are over 420 combinations in the American Optical line of metal (F5100 series) and plastic (F9500 series) safety glasses. You can give every worker the type of eye protection he needs. You can fit any worker.

SEE THESE SAFETY GLASSES WITH BALANCED VISION AT THE AO BOOTH, NATIONAL SAFETY SHOW.



The Big Benefit is BALANCED VISION

With "compensated" or balanced vision throughout the lens, the worker obtains optimum seeing qualities from his glasses whether he looks up, down, laterally or straight ahead. Naturally, this "balanced vision" will increase visual efficiency and safety on the job . . . reduce production and eye accident costs. This advance is available in all regular prescription ranges.



DR. EDGAR D. TILLYER,
internationally recognized Dean of
Ophthalmic Lens Design.

Facts about the AO TILLYER Principle of ADJUSTED CORRECTION

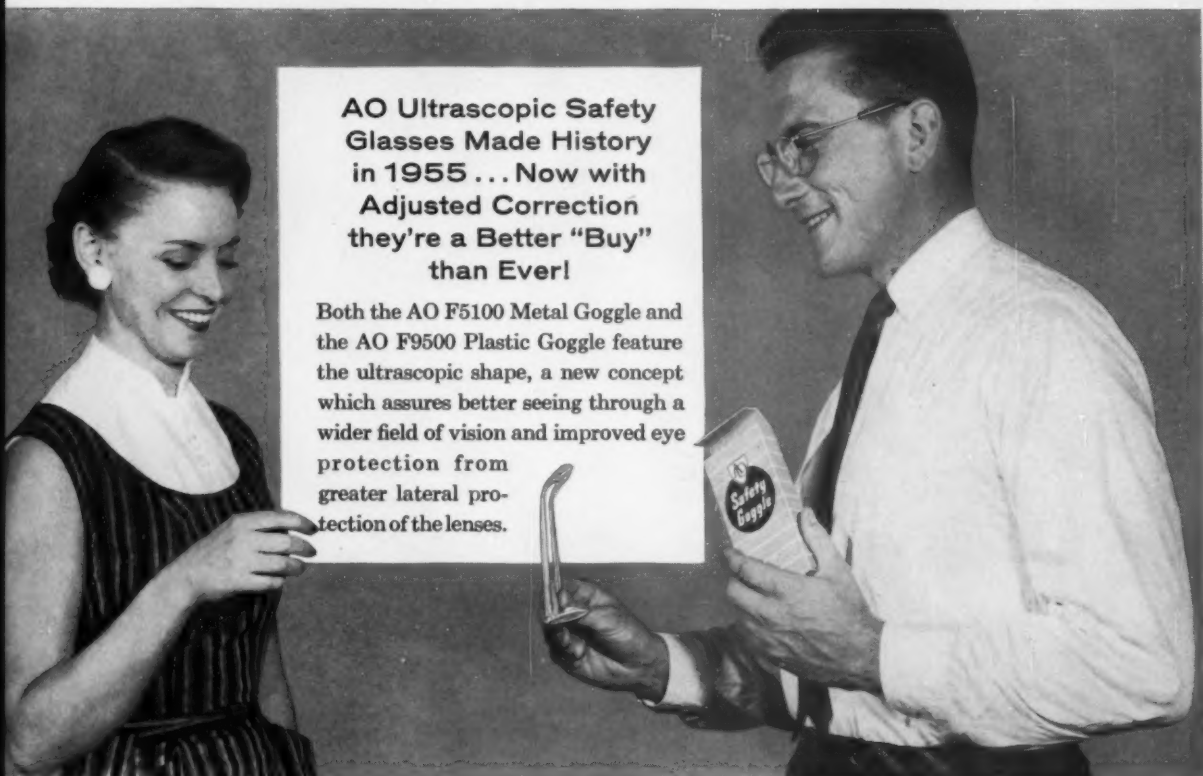
Lenses which interpret the services of the ophthalmic profession should be constant in R₁ power from center to edge. Such constant R₁ power depends upon achieving a balance between marginal sphere and cylinder characteristics of the lens. For over thirty years the Tillyer Principle has been the accepted standard in achieving this balance. Now, new computations make it possible to apply the well-known Tillyer Principle to safety-thickness S.A.P. lenses.

Electronic computing gives a new scientific dimension to lens perfection. This advance for the first time is adapted to safety lenses and is now available with American Optical eye protection equipment.

AO — "First!" Safety *Rx* Glasses

AO Ultrascopic Safety Glasses Made History in 1955 . . . Now with Adjusted Correction they're a Better "Buy" than Ever!

Both the AO F5100 Metal Goggle and the AO F9500 Plastic Goggle feature the ultrascopic shape, a new concept which assures better seeing through a wider field of vision and improved eye protection from greater lateral protection of the lenses.



Quick Facts on the F5100 Goggle

EYEWIRE — Designed to hold lenses safely without strain. Lenses if struck will be retained more effectively against being forced out of frame.

TEMPLES — Cable and spatula types (the latter available only on goggles without side shields). Both types easily adjustable and very comfortable.

BRIDGE — Increased thickness for extra long life, permanently trued, permanently adjusted.

SIDESHIELDS — No brace bar obstructs vision. Removable, individually fitted and adjustable, double-braced for strength. Size for each frame clearly marked.

NOSE PADS — Acetate, won't corrode, easily replaceable. Very comfortable — they spread goggle weight evenly.

LENSES — Planos are interchangeable. AO Tillyer 6 curve Super Armorplate Clear or Calobar (medium, dark or extra dark) . . . with Balanced Vision.

NICKEL CONTENT — Maximum to prevent corrosion yet maintain flexibility.

ENDPIECES — Reversible on side shield model for compact folding.

PAD ARMS — Wide solder area for durability, no sharp bends, long guard arm for greater range of adjustment.

SCREWS — Deeply grooved for easy replacement of components. Wide shoulders mean long life at a vulnerable spot.

BEADED ENGRAVING — Women workers like a touch of distinction like this — an American Optical exclusive.

Always insist on the AO trademark on lenses and frames.

American Optical

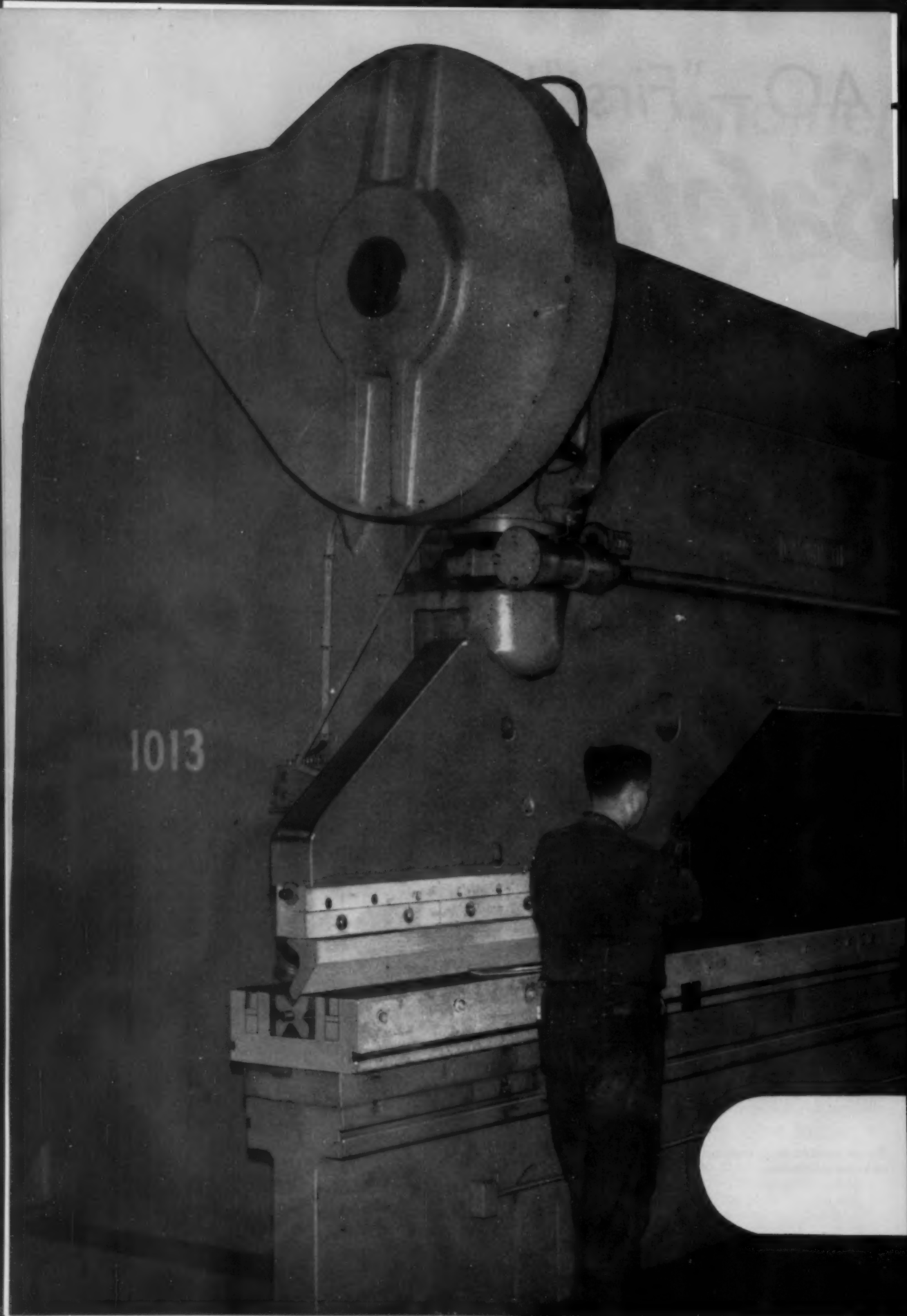


SAFETY PRODUCTS DIVISION

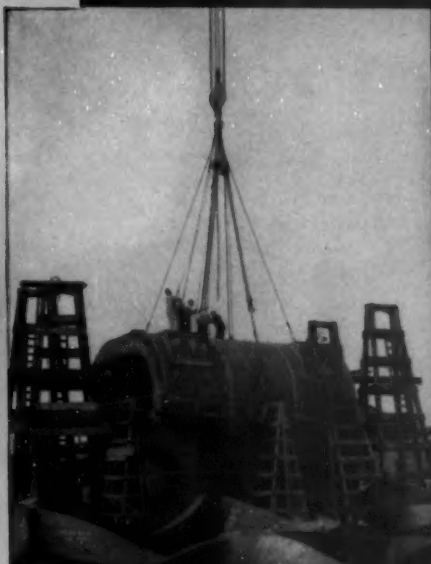
Note!

AO's F9500 Series Plastic Safety Glasses provide similar advances in engineered eye protection. Features include cup goggle type security and fitting in a spectacle, side shield goggle . . . dielectric qualities . . . safety standard flame resistant plastic frames, and other advantages.

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES



Here- a Cincinnati Press Brake saves 3 ways...



1. TIME

**2. NUMBER OF
OPERATIONS**

3. MATERIAL

Built at The Maryland Drydock Company, these giant condensers for the Westinghouse Electric Corporation are some of the largest ever constructed.

Photographs courtesy of The Maryland Drydock Company, Baltimore, Maryland

Crimping plate up to 3" thicknesses has cut roll-forming time in half at The Maryland Drydock Company.

The press brake crimps the ends of the plates with special dies, and has eliminated both the costly burning operation, and the loss of 15" to 18" of the ends of the plates.

Some of the large radius bends are done entirely on the Cincinnati Press Brake.

Write for the comprehensive 72-page Press Brake Catalog B-4.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A.

SHAPERS • SHEARS • BRAKES



**this man uses radiography
for product control**



\$80 a month
invested in equipment
SAVES him thousands
a year in needless rejects
...his customers are *happy*

**this man
doesn't**



high reject rate
(correctable by radiography)
COSTS him thousands
a year in needless waste
...his customers *howl*

**Makes no difference what you make or buy or sell...
if it needs "seeing into" for quality control, radiography
(gamma or x-ray) can probably profit you, as it does others.**

Talk it over with your local Picker representative *
or write us outlining your problem and, if possible,
sending typical samples. We'll make tests and tell you
frankly whether radiography holds any promise for you.

**Costs you nothing to find out...
maybe it's costing you a great deal right now NOT TO.**

*There's probably a Picker district office near you (see local 'phone book).



PICKER X-RAY CORPORATION
25 South Broadway, White Plains, N. Y.

Picker... your one Source for Everything in Radiography and Fluoroscopy

A world-wide business built on quality files...Nicholson File Company is the largest file maker in the world



Because files are such universally important hand tools, Nicholson File Company has built a world-wide business specializing on this one product alone. In industries, shops and homes throughout the free world, Nicholson and Black Diamond are the best known and most widely sought after file brands. To fill this demand at lowest cost to file users, Nicholson has recently built ultra-modern plants in Canada and The Netherlands. There, as in its three factories in the United States, efficient file-making equipment plus constant file research combine to make Nicholson the world's leading manufacturer of a file for every purpose.

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WORLD'S FOREMOST MANUFACTURER OF FILES FOR EVERY PURPOSE



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In any language, Nicholson means file quality

Nicholson and Black Diamond are the measuring stick for file quality the world over. In each of the company's five factories, the painstaking attention to detail is the same. From selection of highest-grade steel blanks through forging, annealing, tooth-cutting, final hardening and sand-blasting—through all operations—conditions are precisely controlled to give you absolutely uniform quality. Thus you can be sure that *Twelve Perfect Files in Every Dozen* is more than a slogan. It is your assurance of files that are made to do better, faster work over a longer period of time than any other files made.

**SPECIFY NICHOLSON OR BLACK DIAMOND FILES
FROM YOUR INDUSTRIAL DISTRIBUTOR**

*Write for free copy of "File Philosophy,"
the Industrial "textbook" on files and filing*

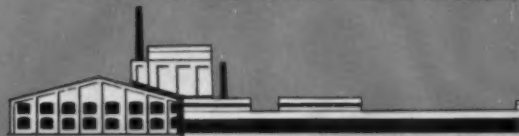
NICHOLSON and BLACK DIAMOND FILES
A FILE FOR EVERY PURPOSE



NICHOLSON FILE COMPANY
Providence, R. I.



Providence, Rhode Island — Nicholson File Company



Anderson, Indiana — Nicholson File Company



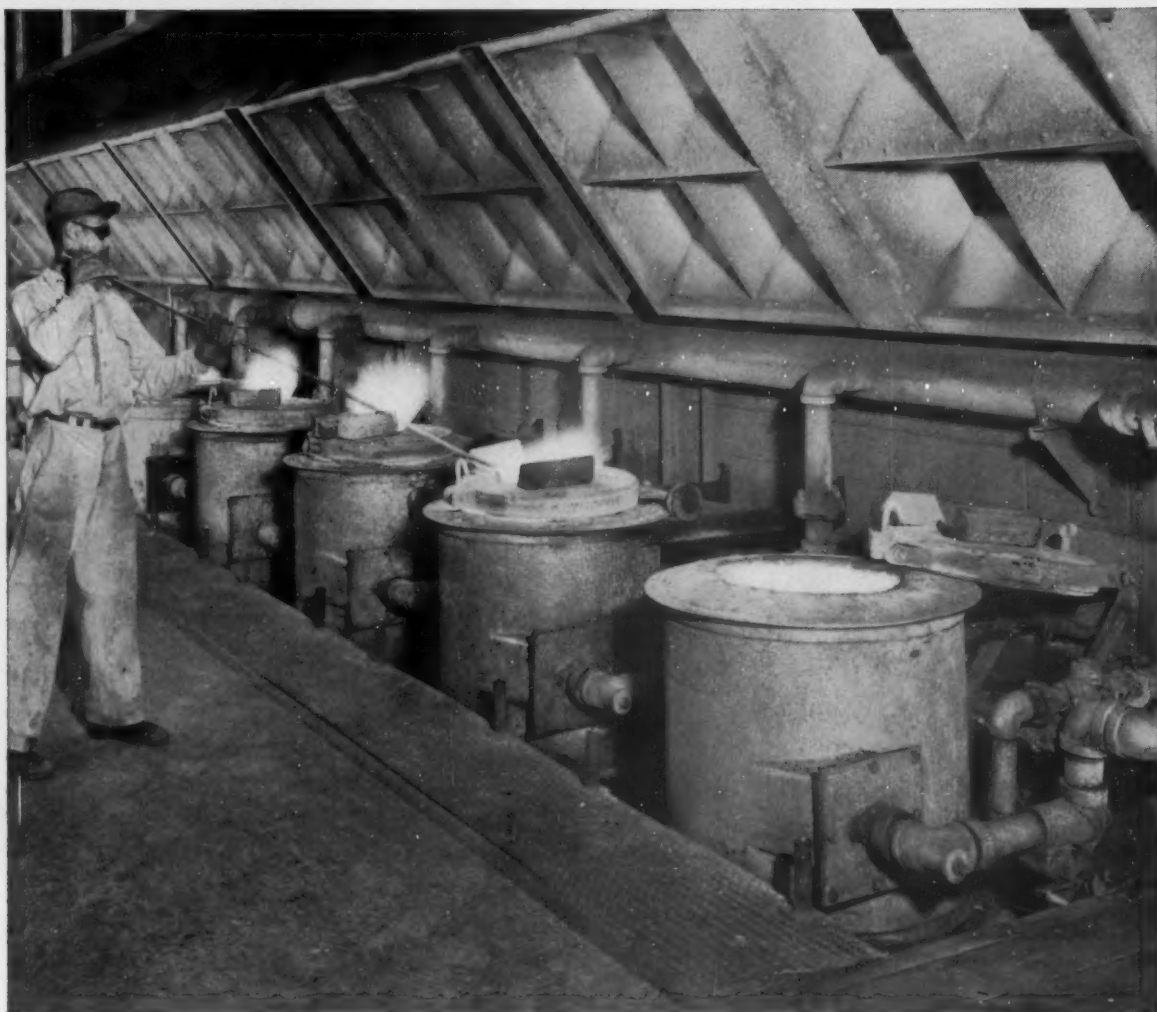
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**Improved working conditions,
less maintenance,
longer life for crucibles and furnace
linings... thanks to *GAS***

*Fischer Casting Company, Inc.
Middlesex, New Jersey*

When Fischer Casting Company, Middlesex, New Jersey, moved into their modern new plant, they chose Gas for all their melting facilities.

With Gas operation of all furnaces, closer melting controls are possible. Clean burning Gas, along with modern ventilating equipment, has resulted in better working conditions in melting departments. Furthermore, in the bronze melting department, improvement is shown in the life of furnace refractories and crucibles. Gas also improves the melting operations in the aluminum sand foundry and permanent mold melting

divisions. Three Gas-fired immersion burners heat an 860 gallon quenching tank to 212 degrees F. and one immersion burner maintains this temperature to provide a simple, dependable and accurate method of quenching aluminum castings.

For information on how you can improve your production operations by using Gas, call your Gas Company's industrial specialist. He'll be glad to discuss the economies and outstanding results you get with Gas and modern Gas-fired industrial equipment. *American Gas Association.*



Walter Casler, left foreground, foreman of automatic production, and Les Danner, assistant purchasing agent, inspect Pittsburgh Steel Company high-carbon, oil-tempered MB wire at Raymond Manufacturing Company plant at Corry, Pa.



Peter Dubrosky, assistant to chief inspector at Raymond Manufacturing Co., Corry, Pa., plant, measures extension of a Westinghouse Laundromat tub spring during a quality control inspection.

You Own 1,000 Springs

Pittsburgh steel wire used by Raymond Manufacturing Co. in long-lasting Westinghouse Laundromat® Springs

One thousand springs of all sizes, shapes and functions are the property of the average home owner. And if the family car is included, the figure would be over 1,600.

Count the many springs in one popular model refrigerator. Add the tiny springs that control thermostats in electric or gas ranges. Throw in the three rugged springs that suspend the automatic washer's tub (if it's a Westinghouse Laundromat®).

Springs serve every day in dozens of ways—silently, surely and safely. Making them is a job requiring top-flight design, best quality materials, the latest coiling machines, plenty of experience and know-how.

A case in point—take one of the

nation's oldest and largest spring makers, Raymond Manufacturing Company, a division of Associated Spring Corporation.

• **Three Vital Springs**—Raymond helped develop and now makes three vital springs which support the tub unit in Westinghouse Electric Corporation's Laundromat. A major supplier of the .207 oil-tempered MB wire from which the springs are coiled are Pittsburgh Steel's wire mills in Monessen, Pa.

Raymond meets Westinghouse's rigid specifications precisely. And Raymond officials give Pittsburgh wire credit for a strong assist.

Les Danner, Raymond's assistant purchasing agent who buys 2,200

sizes and types of materials at Corry, Pa. says:

"I'm fully sold on the quality of Pittsburgh Steel's wire. Pittsburgh Steel has become a major supplier for us because its quality is tops."

Walter Casler, foreman in the automatic production department, has 26 years of experience behind him when he says:

• **"Best I've Ever Seen"**—"I don't ever recall a rejection of Pittsburgh Steel's wire for quality. Pittsburgh's oil-tempered, especially, is some of the best wire I've ever seen."

Raymond must depend on the quality of the wire when making the Laundromat springs. These springs are coiled extension springs, tapered at one end to a bell shape. Two of the three springs on each tub are 6 $\frac{3}{8}$ inches long, 2 $\frac{1}{2}$ inches O.D., and weigh one pound, seven ounces each. The third spring is smaller.

The two larger springs must be capable of supporting 52 pounds at 9 $\frac{1}{2}$ " extension. At 11 $\frac{1}{8}$ inches, they must carry 78 pounds. Because the three springs are the main support of the tub unit in the Laundromat, they must be both load-supporting and vibrating springs.

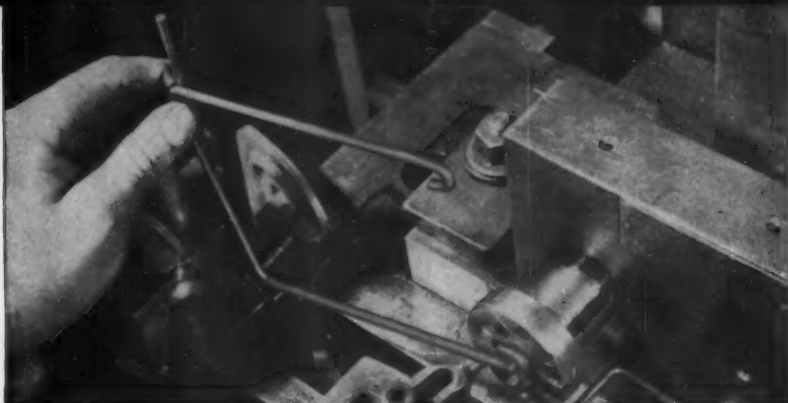
• **Surface Quality Counts**—If any of the three springs fails in use, the cost would be the expense of a complete dismantling to make repairs. That's why Raymond has installed a number of quality control inspections and tests throughout the production process.

Pittsburgh Steel also is Raymond's major supplier of hard-drawn, high-carbon MB wire. Pittsburgh Steel ships to Raymond tons of basic, bright, low carbon wire as well.

Raymond's experience with Pittsburgh Steel wire has been duplicated in many other plants across the nation.

Pittsburgh Steel's range of wire products can fit quickly, profitably into your operations. Its 50 years of experience in quality wire-making, its willingness to give service, its own extensive facilities and those of its subsidiary, Johnson Steel & Wire Company, can be the answer to your wire problem.

There's a national sales staff at your disposal. Contact any member of it today.



1. An 18 $\frac{1}{8}$ inch piece of Pittsburgh Steel Company's .162 bright low carbon basic wire is hook wound on either end before being formed into a drawbar for extension spring on boat trailer.



2. Fourth and final forming operation in making drawbar is to form the loop.



3. Drawbars are inserted in opposite ends of 5 $\frac{7}{8}$ inch spring to form unit. Spring is made from .105 hard drawn wire.

Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

District Sales Offices

Atlanta Columbus
Chicago Dallas
Cleveland Dayton

Detroit Houston
Los Angeles

New York Philadelphia
Pittsburgh

Tulsa Warren, Ohio



LANDIS PIPE THREADING MACHINES



... 4 Major Features Increase Efficiency

1. WIDE RANGE—Just three LANDIS Pipe Machines (2", 8" and 18") will thread all diameters of pipe from 1/2" to 18". Each machine is constructed so as to handle a wide range of pipe sizes—for example, the 6" machine will thread all diameters from 1" to 6". Universal size adjustment allows quick set-up.

2. DIE HEAD EFFICIENCY—The design of Stationary heads provides maximum rigidity on all diameters within their range. Positive locking action is assured through a self-locking toggle joint. Size adjustment is quickly and easily obtained through the use of a single locking nut.

3. LOW TOOL COST—Chasers operate at a tangent to the work. Line contact at cutting edge reduces friction. Permanent throat assures even chip distribution. Variable rake affords proper cutting edge for different materials. Landis chasers are useable for 80% of their original length. They are individually replaceable and, within the range of a given die head, a single set can be used for all diameters of the same pitch, form and taper.

4. PRECISION TAPERED THREADS—The Receding Chaser Pipe Machines are especially designed to cut tapered threads to meet A.P.I. requirements. Chasers recede into the die head at a rate equal to the taper of the thread, ensuring accurate and uniform taper along the full thread length.



LANDIS Machine CO. WAYNESBORO PENNSYLVANIA

NOW

**SINK
DIES
FASTER
in FINKL
Die Blocks with**



Machining time, such as planing, rough cutting, milling, hand benching and burring are appreciably reduced on Finkl SMQ Die Blocks. Thorough field testing shows that the Special Machining characteristic of SMQ saves shop time and gets the die into production sooner.

There is a Finkl steel available for any forging need. All are quality controlled through each step from our own melt shop to final inspection.

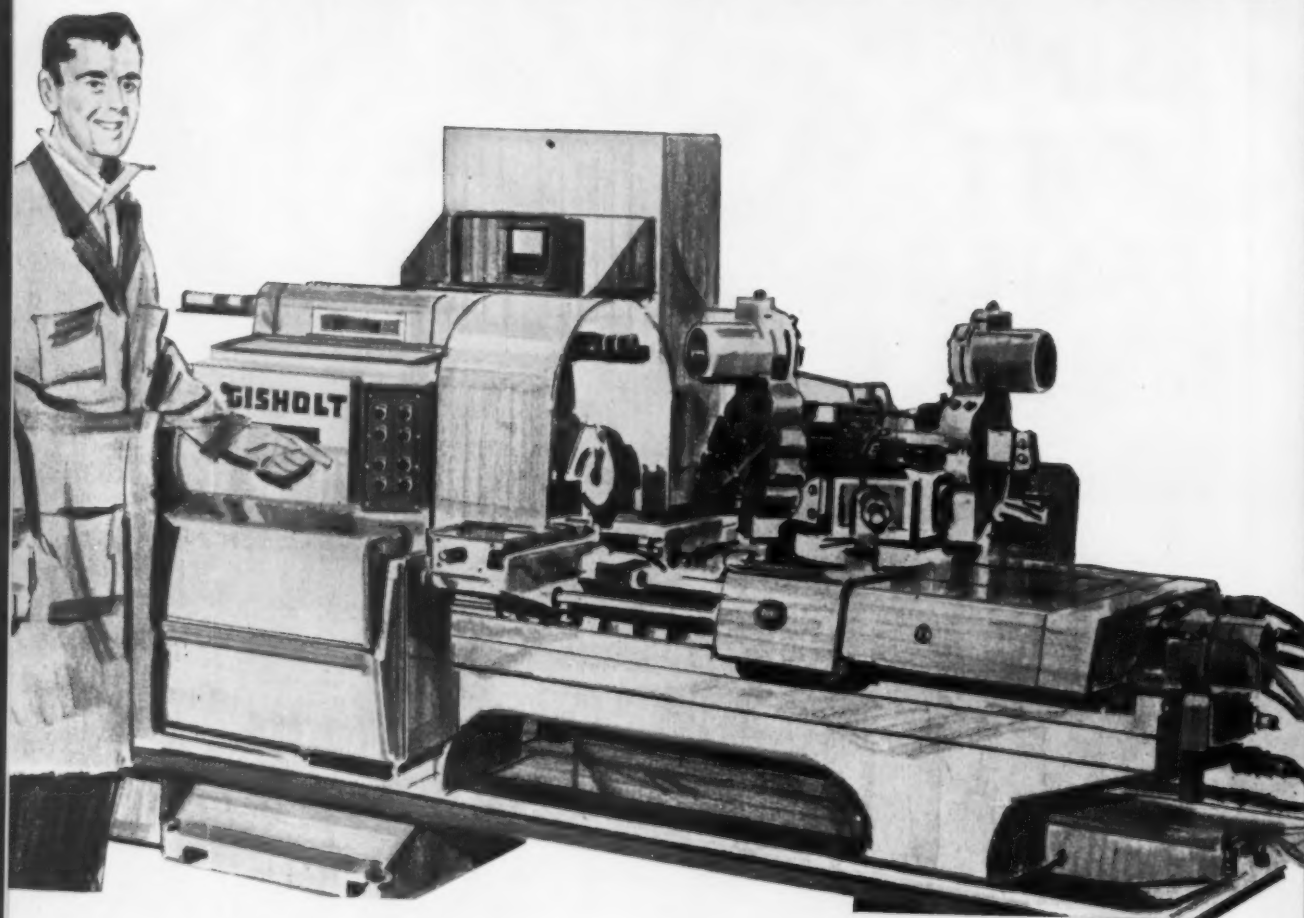
When you next consider die blocks, your local Finkl representative will gladly help you plan for "impressions that last."

**DIE BLOCKS
HOT WORK
STEELS
FORGINGS
ELECTRIC
FURNACE
STEELS**

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A. Finkl & Sons Co.
2011 SOUTHPORT AVENUE • CHICAGO 14

NEW Gisholt Fastermatic **CUTS YOUR SETUP TIME**



GISHOLT
MACHINE COMPANY
Madison 10, Wisconsin



TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • PACKAGING MACHINES • MOLDED FIBERGLAS PLASTICS

control panel

50% OR MORE

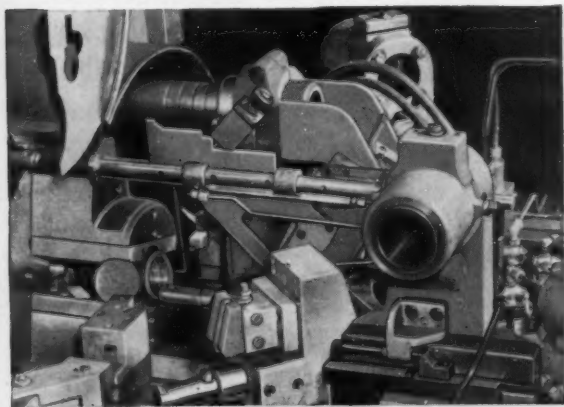
BY SIMPLY FLIPPING TOGGLE SWITCHES, your operators can cut automatic turret lathe setup time 50% or more with this electric setup control panel.

Thoroughly proved in production lines, this control panel is one of the many advanced features available on the new Gisholt MASTERLINE Fastermatic Automatic Turret Lathe.

Here's how the panel works: within finger-tip reach, your operator has a horizontal row of toggle switches for each face of the hexagon turret. By simply flipping the switches right or left, he pre-selects desired machine functions. Re-runs? Here the Fastermatic makes even more drastic cuts in setup time. A master reference card, made from the previous run, is used, and the machine is ready to go with absolute minimum preparation. Feed changes are fast and easy. Tool overhang is quickly minimized by re-positioning the saddle. Anywhere within the machine cycle, the operator can make a trial cut, withdraw the tools, make the part, re-set the tools and resume forward feed.

What does this versatility mean to your own operations? It means more time spent cutting chips and more profit per piece. It means that less skill is required of the operator and he is free to handle additional units or do other work during machining cycles. It means you can utilize smart tooling and eliminate human errors... get record production on long runs... and also get the advantages of automatic cycle operation on relatively short runs.

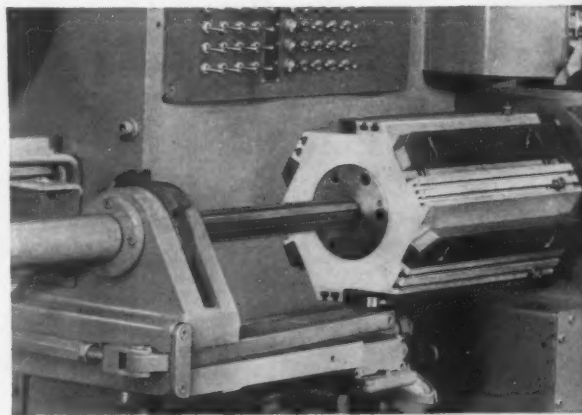
Ask your Gisholt Representative to tell you about the Fastermatic's new electric control panel... its increased capacity... its higher speeds and feeds and heavier construction. You'll also want to know about using the Gisholt JETracer on the Fastermatic. Call him today—or write Gisholt for literature... ask for Bulletin No. 1179.



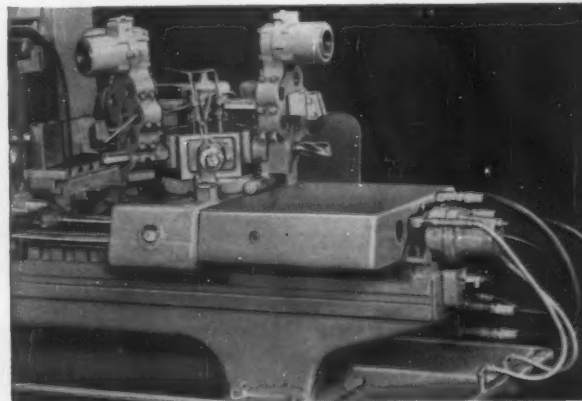
GISHOLT JETracer—mounts on any one of Fastermatic's turret stations. Provides exceptional accuracy for turning, boring or facing—either straight, taper or contour. Hydraulically operated; stylus follows contour of template controlling movement of single-point tool on sliding member.



NEW GISHOLT FASTERMATIC CONTROL PANEL—simple toggle switches govern basic machine functions, cutting initial setup time in half. Master reference card is used to cut setup time still more on re-runs.



HEXAGON FEED CONTROL DRUM—positioning of adjustable flat bars on each face determines rate of feed. Thumbscrew actuator pins in slots on each face determine point of change from traverse to feed and length of feed.



FASTERMATIC TURRET SADDLE is hydraulically powered for indexing and longitudinal movement. Automatic cycle easily set up with turret double- or triple-tooled. **CROSS SLIDES**—front and rear—operated by forward movement of turret saddle, can work independently, or together, with any turret face.



This is your Finishing Specialist

a "one-man" team

The Finishing Specialist from Lowe Brothers is more than a seller of paints and finishes. He is a production specialist, well-versed in all processes and materials, and the latest in finishing techniques and equipment.

His "know-how," and ability to quickly analyze your problems, is capably supported by highly skilled research, development and production experts. He coordinates this know-how with your individual product and plant requirements and follows through to expedite preparation of the finish.

Call on him now and put this team to work immediately. The result will be the best finish for the job. Call or write The Lowe Brothers Company, 424 East Third Street, Dayton 2, Ohio.

LOWE BROTHERS

INDUSTRIAL FINISHES

...also Style-Tested  paints for the home

What
are your
refractory
castable
problems

?

- High Temperatures?
- Abrasion and Erosion?
- Slag Attack?
- Overhead Applications?
- Insulating Properties Required?

B&W makes a wide range of specialized refractory castables. Whatever your problem, you will find helpful data in B&W Bulletin R-35. Send for your copy today.

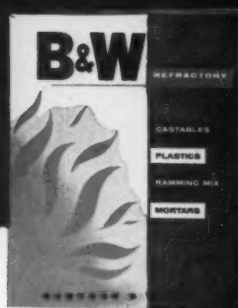


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B&W REFRACTORIES PRODUCTS: B&W Alund Firebrick • B&W 80 Firebrick • B&W Junior Firebrick • B&W Insulating Firebrick • B&W Refractory Castables, Plastics and Mortars • B&W Silicon Carbide



Report on Research and Development at Erie Forge & Steel Corporation



Shaft is rotating during non-destructive sonic test

No Defects In This 75,000 Pound Forging

Today's demands by the electrical industry for large rotor forgings free of unsound metal are met at Erie Forge & Steel Corporation by a continuing research, testing and development program.

For example, this 75,000 pound rotor forging is being tested by the Ultrasonic Reflectoscope, a test so sensitive that it will expose structural defects of microscopic size. Even under so rigorous a test, this huge forging showed *no defects*.

Through the years our continuously expanding program of Research and Development, keeping abreast of progress in the metal industry, has resulted in the use of the most modern techniques in the Open Hearth, Forging, Heat Treating and Quality Control Divisions. Under direction of our Metallurgical Department we are producing:

- Cleaner, sound ingots
- Control of phosphorus and sulphur
- Maximum elimination of hydrogen in steel making
- Ingot mould design and solidification characteristics
- New compositions with greater ductility, notch toughness
- Accurate temperature control in melting, forging, treating
- New forging techniques to insure metal soundness
- Improved concepts in testing and evaluating quality

Another example of the advantages of one responsibility and one control.



ERIE FORGE & STEEL CORPORATION • ERIE, PENNSYLVANIA

MEMBER AMERICAN IRON AND STEEL INSTITUTE



The Best

are the easiest

to get

FOOTE BROS. LINE-O-POWER SPEED REDUCERS

Standardized interchangeable gearing — by Foote Bros. — lets you specify and get the particular reducer you want, in the quantities you need, direct from stock! Duti-Rated Lifetime Gearing in a complete range of interchangeable sizes, ratios and capacities are stocked and ready for assembly. Capacities range up to 200 H. P., ratios to over 2700 to 1. Standard foot and flange type cast housings are stocked, too, for straight or right angle drives. The drives you want are assembled from stock components and shipped as soon as your order is received. For a complete index to the almost endless variety of Line-O-Power reducers immediately available, write for your copy of the Line-O-Power catalog today. See for yourself how you can get more for your drive dollar . . . faster!



Standard foot and flange type cast housings in stock



Housing sub-assemblies in stock



Standardized pinions in stock



mean faster deliveries from stock!



This trademark
stands for the finest
industrial gearing model

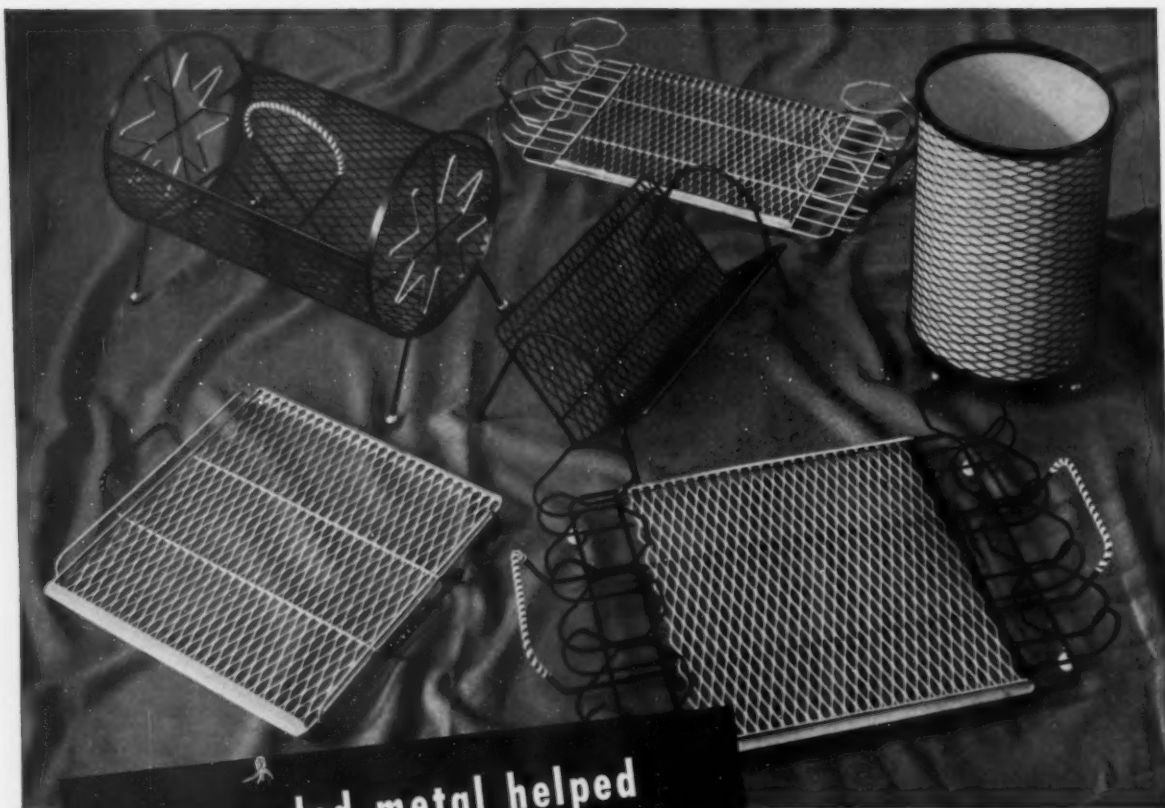
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FOOTE BROS.

Better Power Transmission Through Better Gears

FOOTE BROS. GEAR AND MACHINE CORPORATION
4545 South Western Boulevard, Department M, Chicago 9, Illinois



Expanded metal helped
make these products an
OVERNIGHT SUCCESS
(Can it do the same for you?)

Six products manufactured by Artistic Wire Products Co., East Hampton, Conn. The attractive modern design is achieved by the use of 1/2" Penmetal flattened expanded carbon steel, combined with wire frames and sheet metal edgings. Tray items are brass plated.

It happens all the time. Somebody gets an idea . . . applies it to expanded metal . . . and turns up with a new, stronger, better looking, more salable product.

Take the case of Artistic Wire Products Company, East Hampton, Conn. Basically a wire fabrication firm, they decided to combine their operation with Penmetal expanded metal to make some new products, which would be both decorative and utilitarian. The first of these items was brought out about two years ago—and sold at a price within reach of almost any pocketbook. Result: Immediate consumer response! In fact, sales were so encouraging that five other items were soon placed on the market.

These popular products demonstrate the possibilities in expanded metal. Made of sheet steel which is slit and stretched from one to ten times

its original width, expanded metal is up to 80% lighter than solid sheet of the same dimensions. The diamond truss pattern adds strength and rigidity, yet permits free passage of light and air. What's more, it is surprisingly low in cost.

So, when you are wondering how to produce your new product, or give an old one a boost, don't overlook Penmetal expanded metal. *It can give you new products, new markets, and new profits.*

PENN METAL COMPANY, INC.

General Sales Office: 40 Central Street, Boston 9, Mass.

Plant: Parkersburg, W. Va.

District Sales Offices: Boston, New York, Philadelphia, Pittsburgh, Chicago, Detroit, St. Louis, Dallas, Little Rock, Seattle, San Francisco, Los Angeles, Parkersburg



PM-118

2,370 lb.

FERROUS

FORGING



CAMERON'S SPLIT-DIE FORGING PROCESS

makes possible a saving in machining time plus a better grain structure in this launching valve body. High quality alloy steel press-forgings with both internal and external contours are produced by Cameron in a great variety of sizes and shapes.

Weight in these forgings is from 200 to 5,000 lbs. but design possibilities of surface and mass have made such a break with past practice that often we are asked, "Is this a forging?"

For information about the unusual advantages of these unusual forgings, write or call . . .



Cameron
IRON WORKS, Inc.

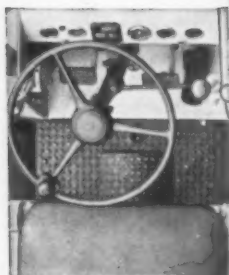
SPECIAL PRODUCTS DEPARTMENT
P. O. Box 1212, Houston, Texas

Your Operator

"Steps Lively" and likes it

... with an Allis-Chalmers Fork Truck!

The operator of this Allis-Chalmers 4,000-lb fork lift truck at a large mid-west foundry is able to "step lively" because his truck drives so easily — maneuvers so well, even in tight quarters.



Important controls are at the operator's finger tips — right where he would like to have them. Gauges are in plain sight — simple and easy to read. Floor is clear, seat can be moved forward or back to suit the operator.

Your operator moves about quickly, spots loads accurately, works relaxed all day. His output is big and steady . . . his contentment is your gain.

These are benefits of the operating ease found in Allis-Chalmers fork lift trucks. Even a green operator does the right thing almost by reflex. He could find the clutch, brake, accelerator and gear shift lever with his eyes shut, for they are positioned like those in his car. The large, 18-inch steering wheel is comfortably positioned and feels "at home" in his hands.

The seat is wide and comfortable, the floor is free of obstructions. Operator can quickly step on or off either side. There is an over-all roomy comfort that seems to stretch a day's output and shorten a day's work.

Examine one of these units at your Allis-Chalmers Materials Handling Dealer's. Ask him to show you the long-life features that keep it going at a lively pace with a minimum of maintenance. Write for free descriptive bulletin, "Put Yourself in the Driver's Seat."

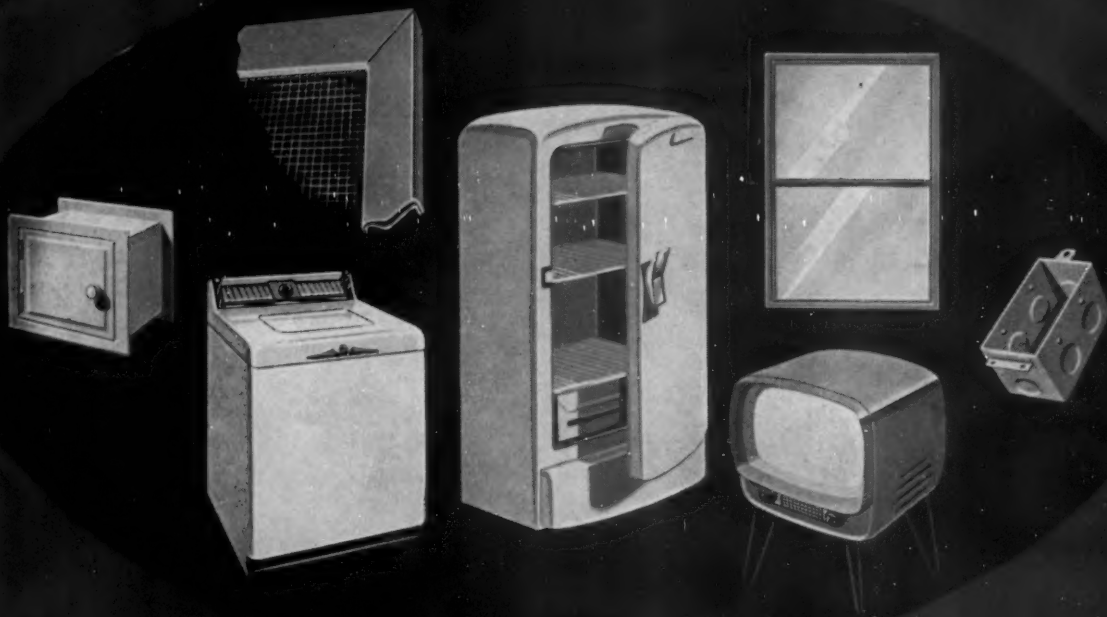
MATERIAL HANDLING DEPT., BUDA DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS



BH-16C

In the long run, galvanized steel...



In the longer run, **WEIRKOTE**

More and more, Weirkote is proving itself to manufacturers of a wide variety of products—under the sternest tests—as a galvanized steel that goes far beyond ordinary galvanized steels.

A special continuous galvanizing process is quality-controlled all the way to make Weirkote withstand the severest stresses of fabrication. Its tightly bonded zinc coat resists cracking, peeling, flaking; resists corrosion for *moisture cannot penetrate to attack the steel underneath.*

And Weirkote's greater strength, rigidity and heat-resistance provide longer life with little or no maintenance.

So for durability, economy, appearance . . . in the *longer* run, Weirkote is your best buy. Put it to work now improving your product . . . and your profits!

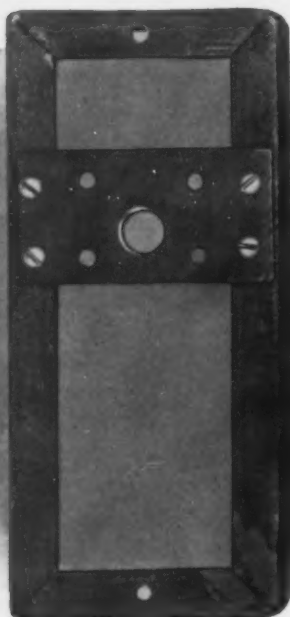


WEIRTON STEEL COMPANY
WEIRTON, WEST VIRGINIA

NATIONAL STEEL CORPORATION



Cost Welded \$2.40



Cost in Gray Iron \$1.10



Which Would You Buy?



**This symbol assures you
the most for
your casting dollar**

Here's why it pays to call in one of the more than 500 leading foundries displaying the Society symbol:

- The most recent technical and business information is available to each member through the Society to help you design better products at lower cost.
- The use of sound cost accounting procedures is recommended and encouraged among Society member foundries, assuring full value for your casting dollar.
- Improved castings result from the advanced techniques and the high sense of responsibility of Society members.

MAKE IT BETTER WITH GRAY IRON

Besides saving over 50% on the cost of this motor mount, the Gray Iron casting provides greater rigidity, and better appearance. The casting process also provides a simple means for manufacturer identification. Obviously, Gray Iron is the better buy.

A quick look at *your* products will uncover applications where time-tested Gray Iron can improve your products and reduce your costs.

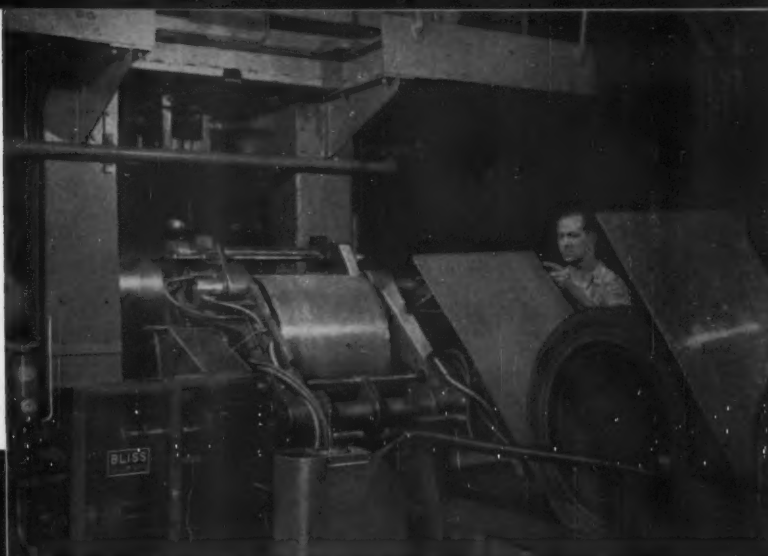
Review the features of Gray Iron—durability . . . vibration absorption . . . noise elimination . . . rigidity . . . heat and corrosion resistance . . . low notch sensitivity . . . wide strength range. These advantages, plus dollar *savings*, make it worth your while to think of Gray Iron *first*.

For specific technical or business information about Gray Iron, write direct to Gray Iron Founders' Society, Inc., National City—East 6th Building, Cleveland 14, Ohio.

GRAY IRON FOUNDERS' SOCIETY

How old are your mills?

See what modernizing with BLISS equipment has done for American Brass' Kenosha Division!



Limit on bar weight raised to 3000 pounds! Before the addition of Bliss entry and delivery equipment, 800-pound bar was the heaviest practical weight that could be put through this single-stand one-way breakdown mill, which reduces the 1/2-inch copper or brass in a series of passes. The new handling equipment readily coils 3000-pound weights of metal and transfers them gently back to the entry side. Similar Bliss equipment is used with a second single-stand mill, which takes the strip to 0.050-inch gage.



One-way mills converted to reversing! Production of larger coil sizes justified the conversion of one-way mills to reverse rolling operations. Bliss handling equipment has made the work easier and safer for the operating and servicing personnel.



1800 fpm. of new finishing capacity added! This brand new Bliss 5-stand 4-high tandem mill reduces the 0.020-inch strip to gages as thin as 0.004-inch in a single pass. It can deliver 1800 feet per minute of half-width strip. According to the Kenosha Division, it is one of the few 5-stand tandem mills in the brass industry, and the most advanced unit for the finish rolling of metal to exacting specifications for gage. Bliss coil buggy, belt wrapper and tension reel handle coils from 6 to 10 inches wide, up to 27 inches O.D. and 1600-pound maximum weights.



TO SEE WHAT BLISS CAN DO FOR YOU, WRITE TODAY FOR A FREE COPY OF OUR 60-PAGE ROLLING MILL BROCHURE, BULLETIN 40-A.

BLISS is more than a name...it's a guarantee

E. W. BLISS COMPANY • General Office: Canton, Ohio • ROLLING MILL DIVISION: SALEM, OHIO



NO SECONDARY OPERATIONS!

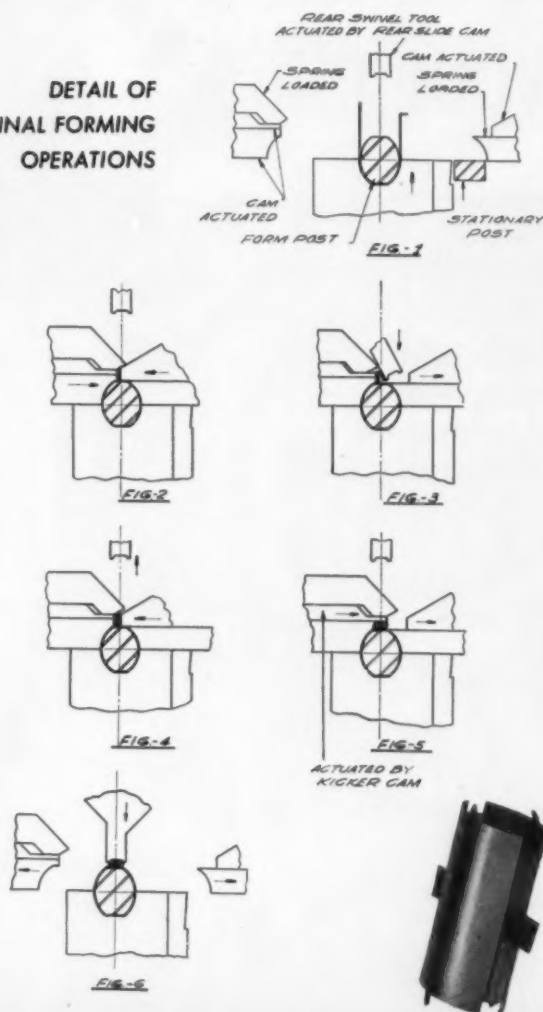
Stamping with folded lock seam
produced complete on the
U. S. MULTI-SLIDE®

The part illustrated is a radio component. This formed metal stamping with folded lock seam is produced complete *without secondary handlings* on a No. 28 U. S. Multi-Slide at the rate of 175 per minute. The sequence of operations in the dies is illustrated by the strip layout at the top of the page. The operations in the four slide forming position are indicated by the drawings

Eliminate Secondary Operations and Reduce Costs: You, like all manufacturers, are interested in achieving this end result. The part illustrated is just one of many different types of formed metal stampings which can be produced complete on the U. S. Multi-Slide. If stampings are included in your production program, the U. S. Multi-Slide may be the answer to your cost reduction problems.

Ask for a copy of Bulletin No. 15-C containing complete specifications for the four sizes of Multi-Slides we now build.

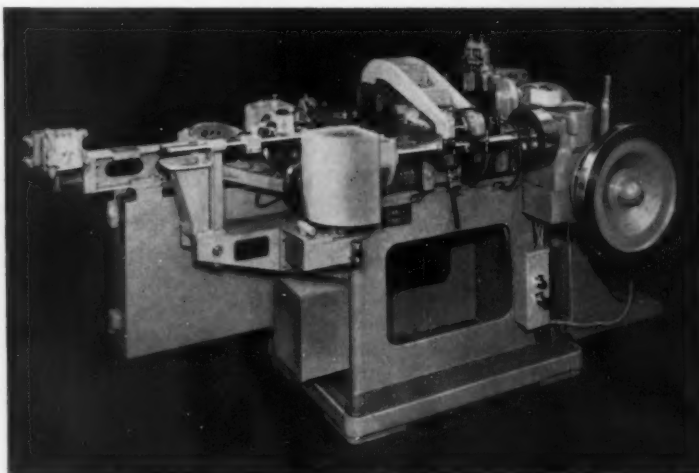
DETAIL OF FINAL FORMING OPERATIONS



The No. 28 U. S. Multi-Slide, Symmetrical type, used to produce the radio component.

**U. S. TOOL
COMPANY, INC.**
Ampere (East Orange), N. J.

Builders of U. S. Multi-Slides
U. S. Multi-Millers
U. S. Automatic Press Room Equipment
U. S. Die Sets and Accessories



ENTHONE

Emulsion Cleaner

75



Removes Oil and Solid Dirt in SECONDS! SIMPLE OPERATION . . . MANY ADVANTAGES

DIP . . . steel parts to be cleaned in Emulsion Cleaner 75 for only *15 seconds*. This simple immersion is done at room temperature (no heating facilities required) and with no irritation of the operator's nose, throat or skin.

RINSE . . . in plain water.

DONE . . . and done *thoroughly* . . . in seconds! All heavy oil films and solid dirt have been removed from every corner and crevice . . . from slots, tapped holes and sculptured patterns.

INSURE . . . smoother, brighter, more adherent electrodeposits . . . and a reduction in pitting.

WRITE FOR FREE LITERATURE ON THIS SIMPLE, FAST, SAFE . . . AND ECONOMICAL . . . METHOD OF CLEANING METALS.

Service Representatives and Stock Points in Principal Cities of
U.S.A. and Canada, Brazil, England, France, Sweden, and Germany

ENTHONE
INCORPORATED

442 ELM STREET, NEW HAVEN 11, CONNECTICUT,
Metal Finishing Processes • Electroplating Chemicals

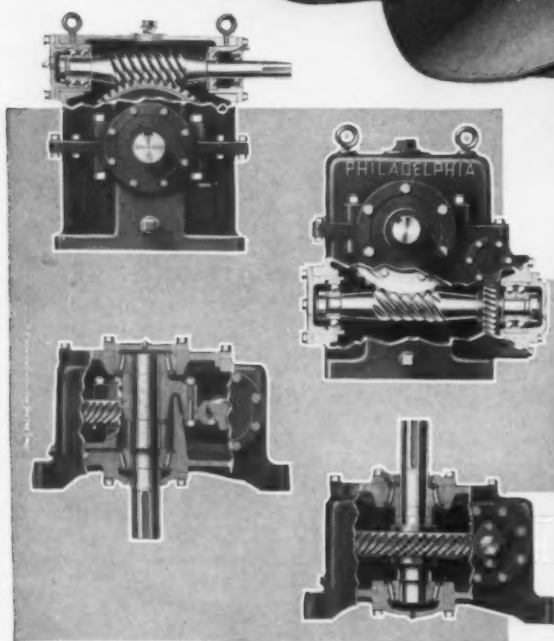


Here's where Worm Reducer Efficiency Begins

Because the service life and efficient operation of any Worm Gear Reducer depends upon the precise meshing of the worm and gear, we make every possible effort to assure that they are properly centered when the unit is assembled, and that the alignment will be permanent... Worms are of finest quality alloy steel with case hardened threads—shaft and threads being smoothly ground and polished after hardening. Worm gears for smaller size units are of solid chill cast nickel-bronze to meet AGMA specifications; while for larger size units the gear is made in two parts—the rim of chill cast nickel-bronze, bolted with fitted bolts and locknuts onto a semi-steel center.

The engineering skill and knowledge put into these features alone are indicative of their entire construction.

Scientific design, unexcelled workmanship, finest materials, rugged construction, noiseless and vibrationless operation, long-life and highest efficiency—are the "end results" that have earned an enviable reputation for Philadelphia Worm Reducers.



PHILADELPHIA WORM GEAR REDUCERS

A complete range of unit types and sizes to cover applications from 1/4 to 265 H.P. Ratios from 3 1/2 to 1, to 6300 to 1. Our latest Catalog, WG-156, gives complete details... When requesting Catalog, please use your business letterhead.

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See the newest developments in Mechanical Power Transmission at our Booth #80—22nd National Power Show New Coliseum, New York City, November 26-30

INDUSTRIAL GEARS & SPEED REDUCERS • LIMITORQUE VALVE CONTROLS • FLUID MIXERS • FLEXIBLE COUPLINGS

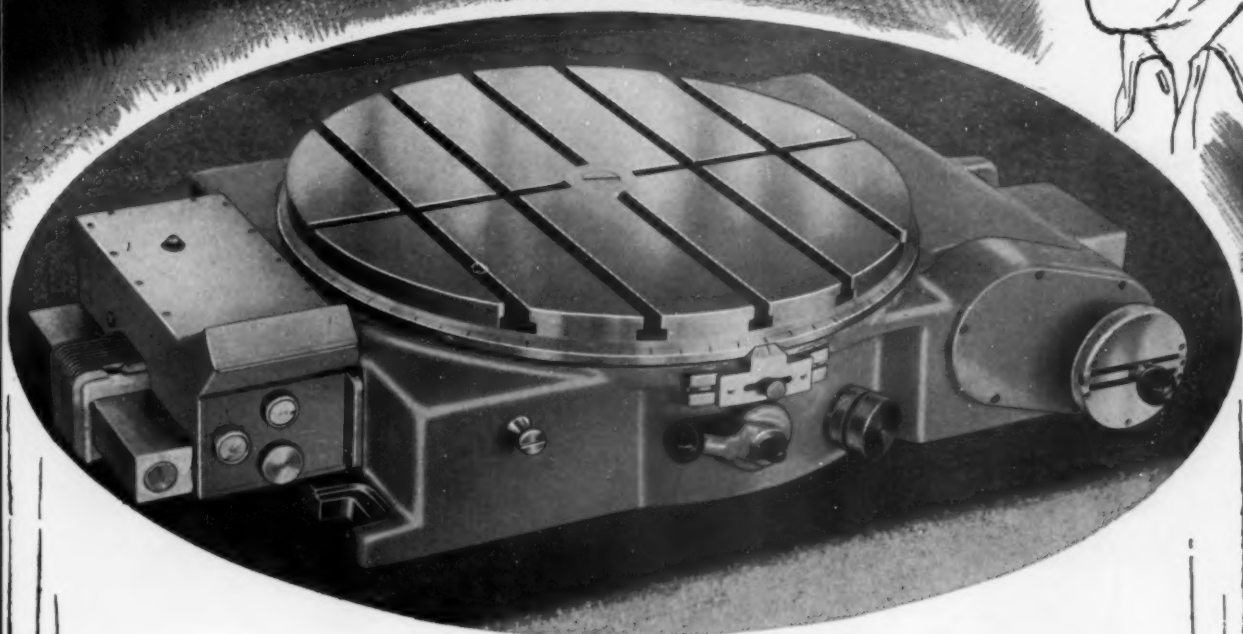
PHILADELPHIA GEAR WORKS, INC.

ERIE AVE. & G STREET, PHILADELPHIA 34, PENNA.

Offices in all Principal Cities

Virginia Gear & Machine Corp. • Lynchburg, Va.

NO SECOND GUESSING
when you set THIS table . . .



because the new **PRATT & WHITNEY**
24" Precision PLAIN OPTICAL ROTARY TABLE
gives direct settings to 1 SECOND OF ARC!

Equipped with an easy-to-read, projection optical system, this 24" Pratt & Whitney Precision Rotary Table provides the MOST CONSISTENTLY ACCURATE MEANS EVER DEvised FOR PRECISE CIRCULAR SPACING AND ANGULAR POSITIONING. In addition, full 360° adjustment of the optical zero point makes it possible to establish the starting point *anywhere* without disturbing the workpiece. Reversible power rotation insures unequalled speed and ease of operation. Used with Jig Borers or other similar precision machine tools . . . or by itself for inspection or calibrating . . . this one-of-its-kind development will bring new standards of speed, accuracy, efficiency and economy to a wide variety of close tolerance manufacturing operations. For complete information and specifications, write for Circular No. 593. Pratt & Whitney Company, Incorporated, 10 Charter Oak Boulevard, West Hartford 1, Connecticut.

ONE IN A COMPLETE LINE OF P & W PRECISION ROTARY TABLES



PRATT & WHITNEY

FIRST CHOICE FOR ACCURACY

MACHINE TOOLS • GAGES • CUTTING TOOLS

Announcement!

...Cleveland

now offers a complete line of

Top Quality

Socket Screws

Our line of socket screws has been expanded to include all standard socket items, in all catalog sizes, made to Cleveland's extra high standards of quality.

Write or phone for this new
Socket Line Folder



Socket Head Cap Screws
Socket Set Screws
Flat Head Socket Cap Screws
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Complete stocks of Cleveland Socket Screw
Products are available for immediate shipment.

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Superior Performance

by all QCF Lubricated Plug Valves

THIS TEFLON GASKET
PREVENTS HEAD LEAKAGE—
REDUCES TURNING TORQUE

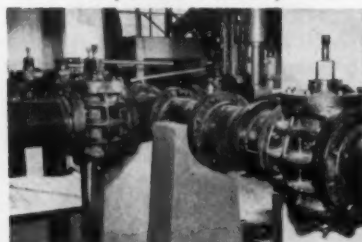


Gasket Characteristics

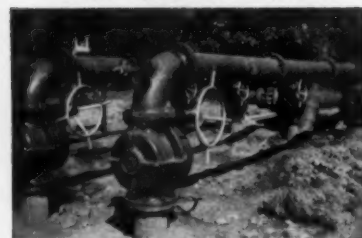
- Self lubricating
- Can't bind
- Unique shape maintains lubricant release
- Pressure tight.



On circulating water pumps
in petroleum industry.



In sewage treatment plant.



Gas measuring station installation.



This Teflon* Gasket is another example why QCF lubricated plug valves are your best buy in round or rectangular port valves.

It not only gives greater protection against head leakage, greatly reduces turning torque, and operates in temperature to 450°F, but it also prolongs service life . . . and that

* DUPONT TRADE NAME

means a substantial saving in valve maintenance costs.

Many years of field testing, plus years of industry service, have proved the importance of this feature in QCF valve performance. See your QCF Representative and learn why it pays to specify QCF valves.

5602

W-K-M MANUFACTURING COMPANY, INC.

A SUBSIDIARY OF QCF INDUSTRIES

INCORPORATED

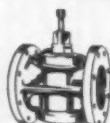
PLANT: MISSOURI CITY, TEXAS • MAILING ADDRESS: P. O. BOX 2117, HOUSTON, TEXAS

MANUFACTURING

W-K-M
THROUGH-CONDUIT
GATE VALVES



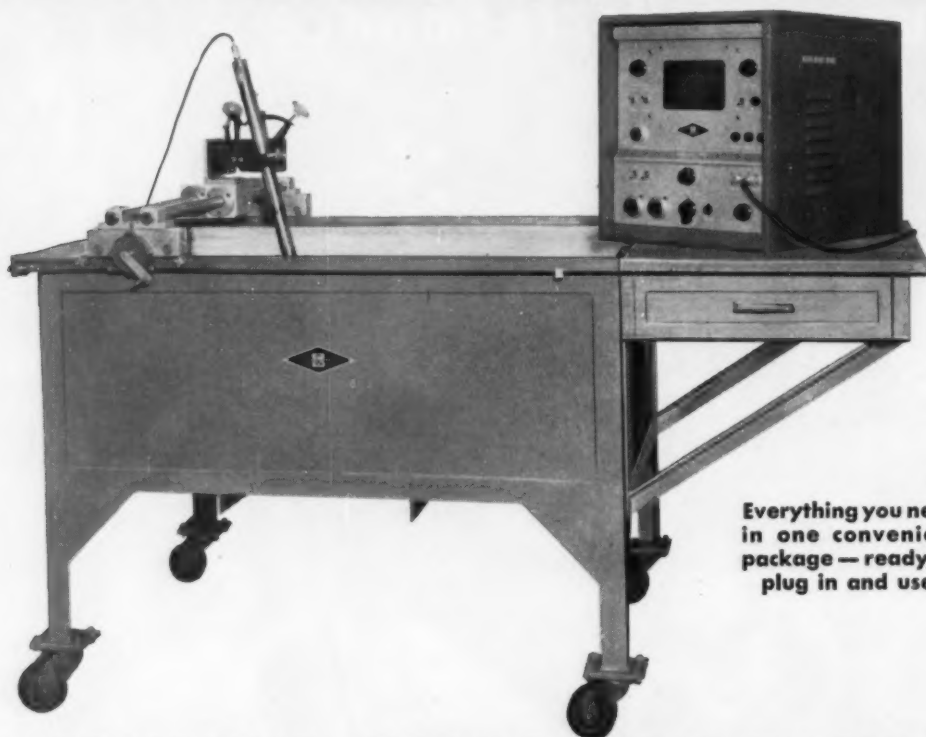
QCF
LUBRICATED
PLUG VALVES



KEY
RETURN BENDS
AND FITTINGS



ULTRASONIC INSPECTION



Everything you need
in one convenient
package — ready to
plug in and use.

A COMPLETE, ECONOMICAL PACKAGE for immersed non-destructive testing

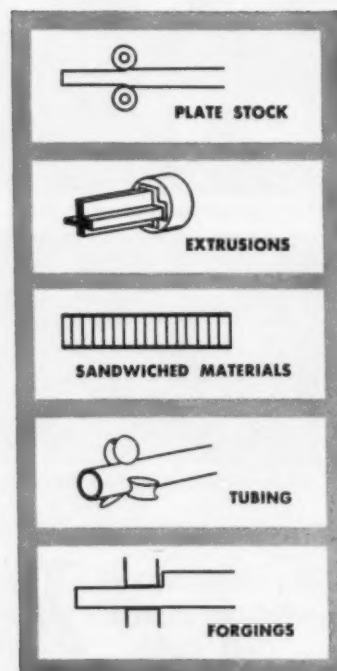
Now Curtiss-Wright offers all the benefits of immersion ultrasonic testing of metal without the expense of purchasing an assembly of several costly separate units. This new low cost "package" combines in a self-contained single unit the Immerscope — the heart of the system — a four-foot tank, search tube and rack, precision manual manipulator, longitudinal and transverse manual scanning mechanism and a complement of crystals. Here is a complete immersion testing, quality control installation ready to operate, whether in laboratory or light production — a system that can be readily expanded, with only minor investment, for more demanding production applications.

The technique is simple. Metal parts are immersed in water in the tank. Ultrasound is applied to penetrate the metal. Defects present will reflect the sound. Those echoes are presented as pips on the cathode ray tube of the Immerscope. Flaw detection is precise and positive.

This Ultrasonic Test Unit Model PT 1001 lowers inspection costs, stabilizes high standards in quality control, and permits analysis of fabrication techniques. Complete information on request. Our local representative is available to discuss your problem.



CURTISS-WRIGHT OF CANADA, MONTREAL • CURTISS-WRIGHT EUROPA, AMSTERDAM



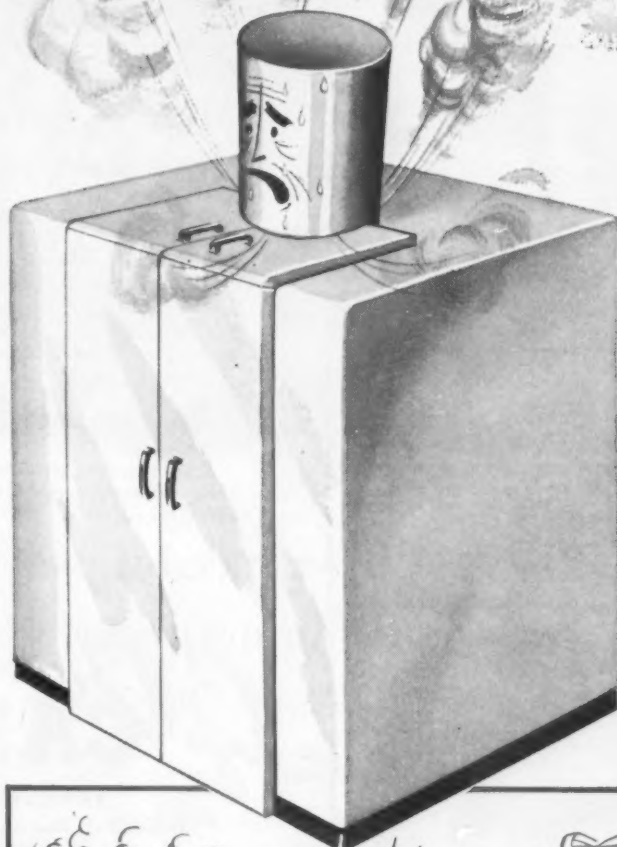
STOP putting up with HEAT, FUMES AND FIRE!

Now you can clean metals better with HOUGHTON COLD CLEANERS

Houghton's new COLD CLEANERS make hot, steamy, dangerous metal cleaning processes obsolete for many shop jobs.

These new cleaners, used at room temperature in both power washers and dip tanks, readily remove processing oils, pigmented drawing compounds, rust preventive coatings. Cold cleaners do away with costly, uncomfortable heating of cleaning compounds. They eliminate the fire hazards and toxicity of low flash point solvents . . . and they do a faster, better cleaning job at low cost!

Get the full story on the cleaning effectiveness of COLD CLEANERS from the Houghton Man, or write direct to E. F. Houghton & Co., 303 West Lehigh Ave., Phila. 33, Pa.



THE HOUGHTON-CLEAN LINE
Emulsion, Acid, Alkaline and Detergent-type Cleaners for every industrial need

... products of

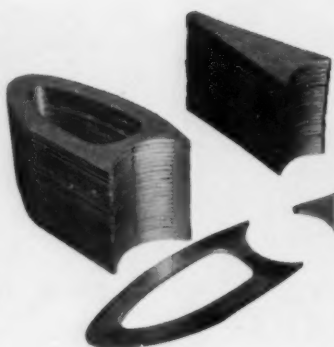
E. F. HOUGHTON & CO.
PHILADELPHIA • CHICAGO • DETROIT • SAN FRANCISCO



Ready to give you
on-the-job service . . .



Blank size: $\frac{3}{8}$ " thick x $16\frac{1}{2}$ " x $23\frac{1}{2}$ "



Blank size: $\frac{3}{8}$ " thick x 9" x 31"



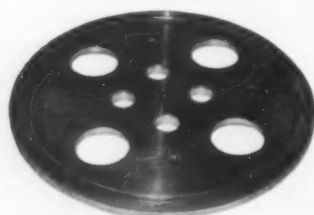
Blank size: 5" thick x 78" OD



Blank size: 4" thick x $7\frac{3}{4}$ " x $71\frac{3}{8}$ ".
Illustrations show before and after machining.



All the products illustrated here were flame cut, sawed, abrasive cut, sheared or machined from stainless steel plate.



Blank size: 2" thick x 60" OD

Stainless steel plate produced to your specifications for quick delivery

Confidence in Carlson service has made G. O. Carlson, Inc. the country's leading specialist in stainless steel plate. As we grew to this position in the industry, we learned and developed new methods of working stainless plate.

What does this mean to you?

It means you can buy for quick delivery exactly what you need in stainless steel plate—sheared, sawed, flame cut, abrasive cut, or machined. And this is true whether the job is a "toughy" or "run of the mill"!

When you need stainless steel plates—special patterns like these or plain rectangles—you'd better try Carlson service, where experience pays off.

Stainless Steels Exclusively
G. O. CARLSON, INC.

THORNDALE, PENNSYLVANIA

Plates • Plate Products • Forgings • Bars • Sheets (No. 1 Finish)

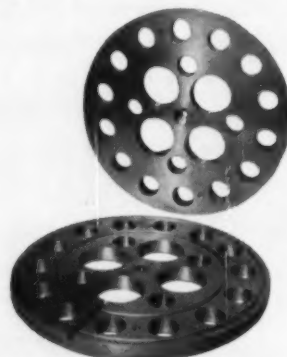
District Sales Offices in Principal Cities



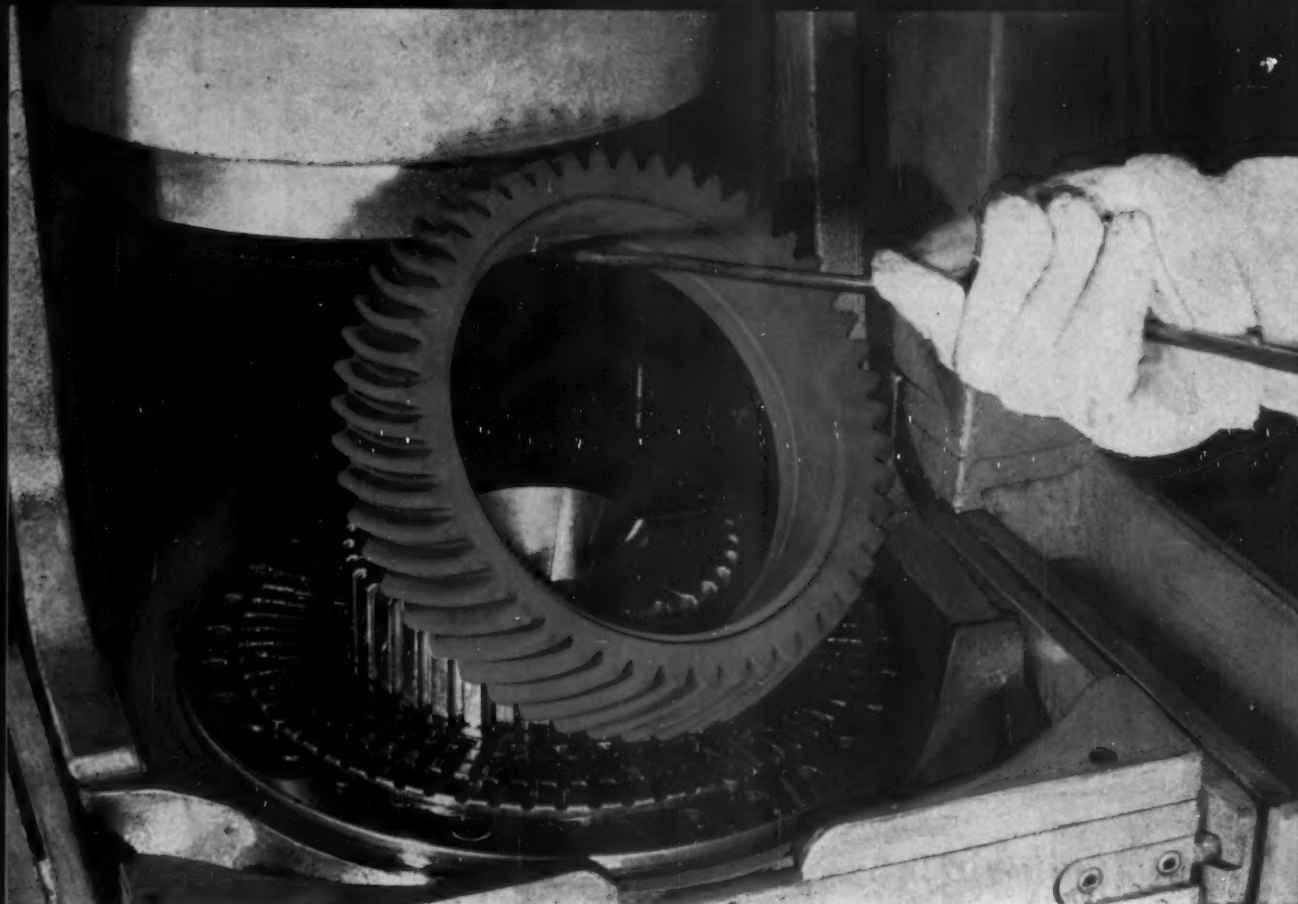
Blank size: $3\frac{1}{8}$ " thick x $106\frac{1}{2}$ " OD



Blank size: $\frac{1}{4}$ " thick x 75" x 88"



Blank size: $1\frac{1}{2}$ " thick x 26" OD



How to hold close tolerances when you quench gears and other parts

If you make parts like this aircraft transmission gear, you know that warpage or distortion during quenching means losing the time and money you've spent machining the part to close dimensional tolerances.

You can avoid such costly losses with Gleason Quenching Equipment.

The hot gear above, for example, is being set on the lower die of a Gleason Quenching Press. A button is pressed and the automatic quenching cycle is started. The lower die is swung back into the quenching position and the upper die descends rapidly, aligning the part while it is still in the plastic state.

The dies securely clamp the gear, but are so designed to permit it to contract

in the normal manner, while still holding the gear true.

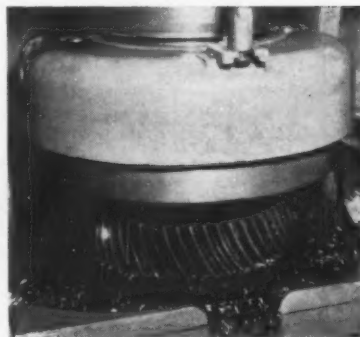
Carefully controlled, metallurgically correct oil circulation hardens the gear to perfection.

Post-quench tests show the gear meets all specifications.

You can give *any* part, regardless of shape, the same distortion-free quenching.

Three sizes of the Gleason Quenching Press harden parts up to 36" diameter. Another press automatically hardens and straightens shafts and shaft parts up to 40" in length.

For literature and recommendations on the press and die equipment that fit your products, send us blueprints.



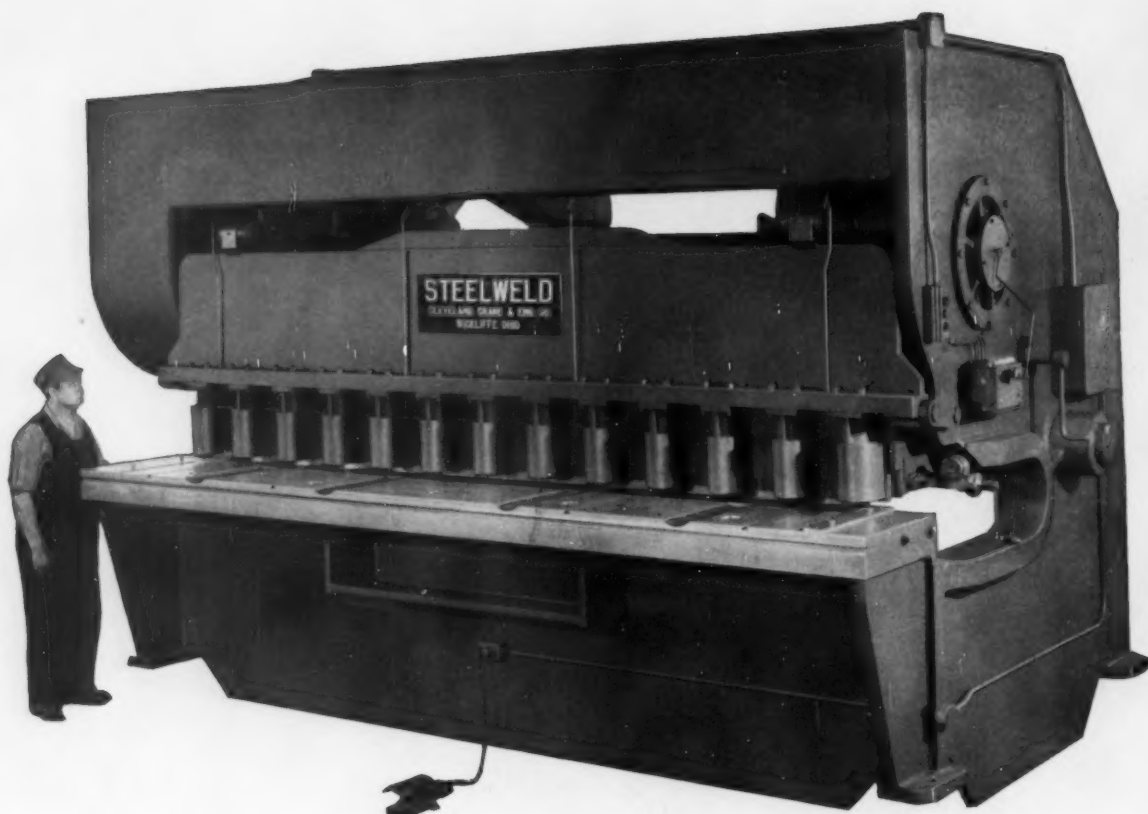
The Gleason Quenching Press forces oil uniformly over and around the part, assuring the correct hardness and distortion-free quenching.



GLEASON WORKS

Builders of bevel gear machinery for over 90 years

1000 UNIVERSITY AVE., ROCHESTER 3, N. Y.



CUTS 12 FEET 3/4 INCH STEEL PLATE at 30 Strokes Per Minute

SOME FEATURES OF THIS SHEAR

1. Cuts by pivoted-blade principle.
2. Operated by electric foot switch.
3. Knife clearance adjusted by hand crank and dial indicator.
4. 36-inch throat permits slitting wide plate.
5. Lift-up type back gauge on ball bearings.
6. Heavy all-welded one-piece steel frame.

This is one of a complete line of Steelweld Pivoted-Blade Shears for cutting plate of all thicknesses from 1/4-inch to 1 1/2-inch and for lengths from 6 feet to 26 feet.

Steelweld Shears are radically different from all other shears now on the market. They have features never before possible. The revolutionary pivoted-blade travels in a circular path and overcomes handicaps of ordinary guillotine-type shears.

Not only are these machines easier to operate but their design assures smooth straight accurate cuts with minimum plate distortion. Their construction is extra heavy, and all modern features are incorporated to provide for ease of operation, minimum maintenance and long life.

Get the facts on these outstanding machines.



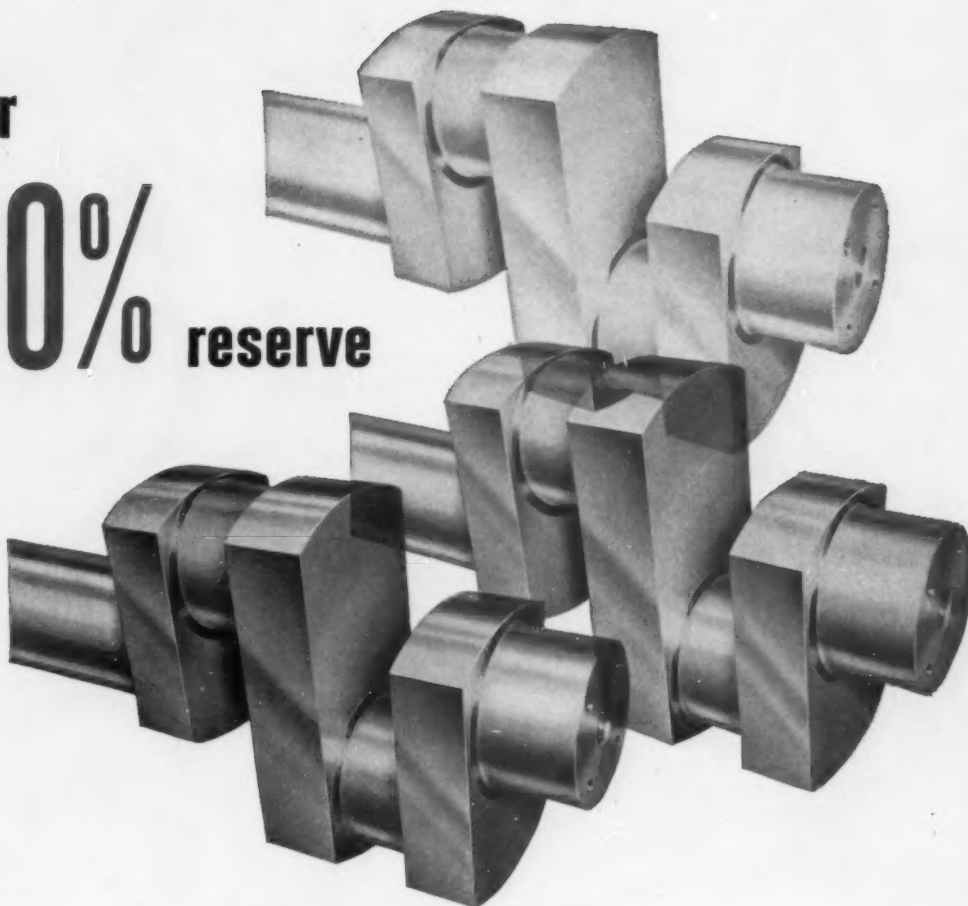
GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.
4810 EAST 282nd STREET WICKLIFFE, OHIO

STEELWELD PIVOTED BLADE SHEARS

Over
300% reserve



*Built in the Crankshafts of many
Clark Balanced/Opposed Compressor Models*

Extra-heavy crankshafts are standard equipment on Clark Balanced/Opposed compressors . . . it's brought about by standardization.

All models of a particular stroke size have the same bearing and crankshaft diameter. As an example, the number one crankpin of all CMA models is capable of transmitting with complete safety 600 BHP. The CMA-2 rated at 150-300 BHP and the CMA-4 rated at 350-500 BHP therefore have a tremendous reserve. The same thing applies to the 14" and 17" stroke CRA and CBA models.

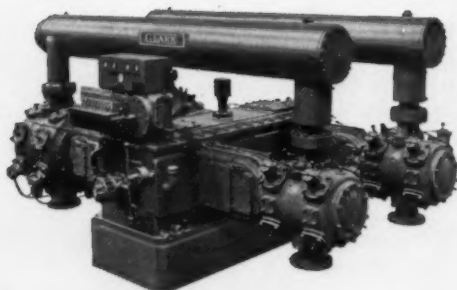
Rugged shaft construction assures maximum bearing life and minimum maintenance. It also eliminates the need for a bearing between opposing cylinder crankthrows which would double the force couple between opposing cylinders and in turn increase shaft stress and foundation requirements.

Your nearest Clark representative will be pleased to give you all the facts on the original Balanced/Opposed compressors, or write for bulletin 118.

CLARK BROS. CO., OLEAN, NEW YORK

One of the Dresser Industries

Offices in Principal Cities Throughout the World

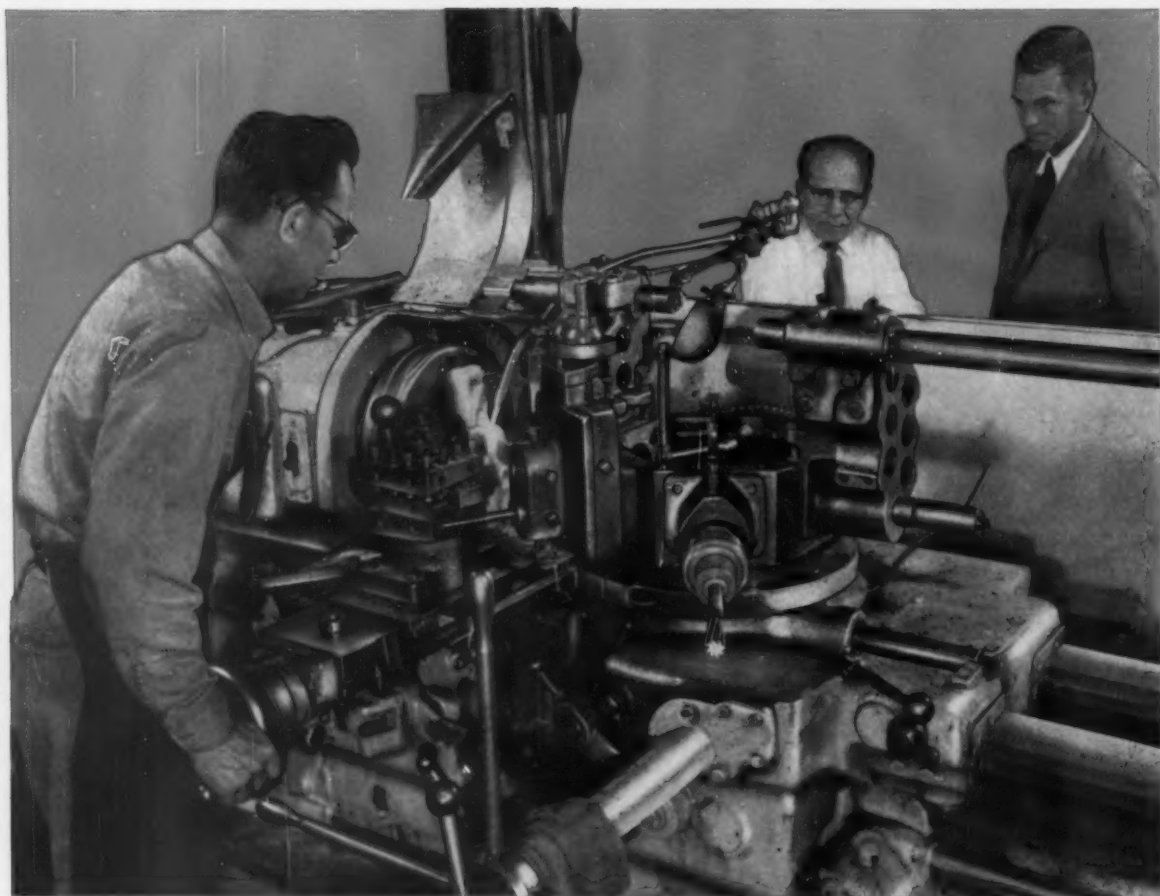


CLARK 350 BHP BALANCED/
OPPOSED AIR COMPRESSOR

CLARK



**Balanced/Opposed
Compressors**



Shop Superintendent Bonnafa and Gulf Sales Engineer G. R. Burnham check on performance of Gulfcut 51A as turret lathe turns a stainless steel drive roll for a wire belt.

"Gulfcut gives us longer tool life," says Joseph Bonnafa, Shop Superintendent, J. W. Greer Company, Wilmington, Mass.

Shop superintendents like Mr. Bonnafa, engineers and machine tool operators *know* that production can be improved and costs lowered through the use of cutting oils designed specifically for the job. And, they know they can get the right oil for *every* job from the complete line of Gulfcut Oils. Reports like these come from the field every day:

From an aluminum plant: "... stepped up production of aluminum caps 25%, increased tool life well over 100%, and we're getting better threads."

From a plant working tough titanium-alloy

stainless steels: "... results were phenomenal. Tool life increased over 40% and surface finish was improved 43 microns."

Your Gulf Sales Engineer can pin-point your cutting oil requirements—can help you improve shop efficiency through the use of the most suitable cutting oils for your needs. Contact him today at your nearest Gulf Office.

GULF OIL CORPORATION
GULF REFINING COMPANY
1822 Gulf Building
Pittsburgh 30, Pennsylvania



THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS

Grand Prize
ARMAND MONARD
 9404 211 Street
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HERE ARE THE WINNERS IN JONES & LAMSON'S NEW HORIZONS CONTEST

2nd Second Prizes

ANDY TOROK
 19322 Santa Clara
 Detroit 19, Michigan
W. H. BRAUN, JR.
 11048 Blix Street
 N. Hollywood, California

3 Third Prizes

CHARLES LEO SADON
 24 Endicott Street
 Saugus, Massachusetts
JOSEPH C. BARRETTE
 24 Rosedale Street
 No. Providence 11, Rhode Island
LEON HAROLD RICE
 RFD #2, Church Road
 Bedford, New Hampshire

10 Fourth Prizes

Edward M. Alexander
 RR 1, Box 234
 Mooresville, Indiana
C. L. Robinson
 1826 Chippendale Street
 Houston, Texas
Daniel J. Ruggiero
 Main Street, Box 7
 Jonesville, New York
George G. Perla
 2331 Colonial Avenue, S.W.
 Roanoke, Virginia
Thomas M. Jackman
 31909 Saginaw Court
 Wayne, Michigan
Louis Marcolivio
 260 Webster Avenue
 Providence, Rhode Island
Euclid U. Lebert
 408 Hillside Drive
 Anderson, South Carolina
Bruce J. DeNeve
 79 Varian Lane
 Rochester, New York
Edward Gagne
 30730 Horse Island Drive
 Gibraltar, Michigan
Frank S. Wozniak
 2331 Harrison Street
 Schenectady 6, New York



heartily congratulates the winners of the Jones & Lamson NEW HORIZONS CONTEST. As winner of the Grand Prize, Mr. Monard, who is Methods Engineer with Control Instrument Co., Brooklyn, N. Y., receives a Two-Weeks Luxury Vacation Trip for Two, All Expenses Paid, to his choice of one of the following: Paris, Hawaii, The Caribbean, The Canadian Rockies, Plus \$400 for spending money, baby sitter fee, etc.

Mr. Torok (Supervisor, Production Process & Design Section, General Products Division, Ford Motor Company, Dearborn, Michigan) and Mr. Braun (Process Engineer, Hughes Aircraft Co., El Segundo, California) as Second Prize winners each receive a Seven-Day All-Expenses-Paid Luxury Vacation for Two to Bermuda, Plus \$200 spending money.

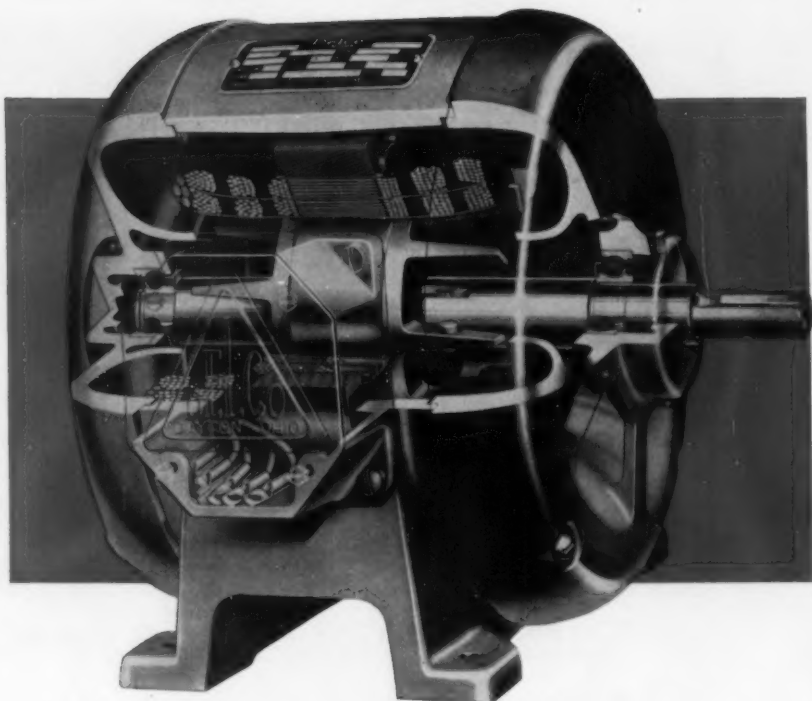
The three winners of Third Prizes each receive a Shopmaster Combination Saw-Jointer Power Tool, complete with motor.

The ten winners of Fourth Prizes each receive a Shopmaster Individual Single-Purpose Power Tool (a choice of Saw, Drill Press, Jointer, etc.)

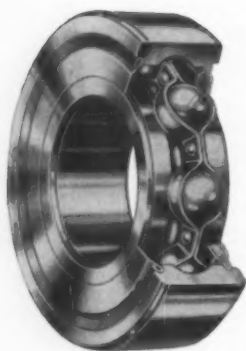
The Board of Judges, in announcing its decision, remarked that the general excellence of the many entries received made the judging process a most difficult one.

To all those who expressed interest in this contest, we extend our sincere appreciation and thanks.

JONES & LAMSON MACHINE COMPANY
 511 CLINTON STREET, SPRINGFIELD, VERMONT



BALL BEARINGS CUT LUBRICATION MAINTENANCE TO VIRTUALLY ZERO



Precision-made New Departure ball bearings assure permanently accurate support of the rotor shaft under all load conditions and mounting positions, plus cool-running, quiet bearings at all speeds.

In normal operation, New Departure sealed and shielded bearings reduce lubricating requirements to virtually zero. Built-in seals on the inside faces prevent grease leakage *into* the motor. Metal shields at the outer faces keep foreign matter *out* of the bearings while permitting entry of just the right amount of grease from the end bell for perfect bearing operation. Overheating from excessive lubrication can't occur.

Join the leaders who look to New Departure for bearings and engineering service in product development and improvement. New Departure, Division of General Motors, Bristol, Connecticut.

BALL BEARINGS MAKE GOOD PRODUCTS BETTER

SEE "WIDE WIDE WORLD"
SUNDAYS—NBC-TV

NEW DEPARTURE
BALL BEARINGS



NOTHING ROLLS LIKE A BALL

NEWSFRONT

Air Force Activating Machine Tools

At least 70 pct of its total inventory of machine tools (about 92,000) and production-equipment items (42,000 to 50,000) are in active service, Air Force reports. It anticipates replacing minimum of 2 to 5 pct of this inventory annually; reducing inactive inventory by putting more such tools in use. All part, says AF, of its continuing program for disposing of worn-out and obsolescent machine tools.

Steel: Who's For Special Shapes?

Drive to trim manufacturing production costs is turning up stream of new uses for steel bars hot-rolled to special cross-sectional shapes. Compared to standard bar forms, specials offer potential savings on machining, grinding, freight, scrap handling. Example: To make an electric typewriter carriage rail from flat bar stock formerly meant machining away 17 pct of the steel. Switch to special saved this loss.

Hotter Lubricants Coming

Watch for new petroleum lubricants capable of standing up under 1000° to 2000°F temperatures—three times hotter than effective limits of most present lubricants. They're now under development. Main problem still to be overcome: Some of these have such high boiling points they freeze at 400°, are no longer fluid and oily at lower temperatures.

Press Extrudes Titanium Faster

Air-Force-owned, a giant new horizontal extrusion press is turning out titanium, and stainless steel sections at an Eastern plant. Of 12,000-ton capacity, the unit turns out 50-ft-long, 6-in.-diam tubes in nine seconds; extrudes 1000 ft of half-inch spring steel rod in three seconds. Unit allows controlled range of speeds, pressures.

Further Blight on Plate Prospects

Fourth-quarter will see no falloff in military demand for hot-top plate. Explanation appears to be exhaustion of the post-Korea buildup in military inventories of this particular steel. Re-

serve inventories began to fizzle out earlier this year. Added military requirements, while not great, will mean another straw on camel's back of overloaded plate-rolling, soaking pit capacity.

What's With CO₂ Briquetting?

There was some disappointment in early results. Despite this, briquetting ore fines or flue dust with CO₂ used to achieve a chemical binder is still a live issue. Now in beginning stages are attempts to incorporate CO₂ with a limey material to produce a limestone-like block. This would wrap ore and limestone in a single "pill" for blast-furnace use.

Silicon Boosts Steel Strength

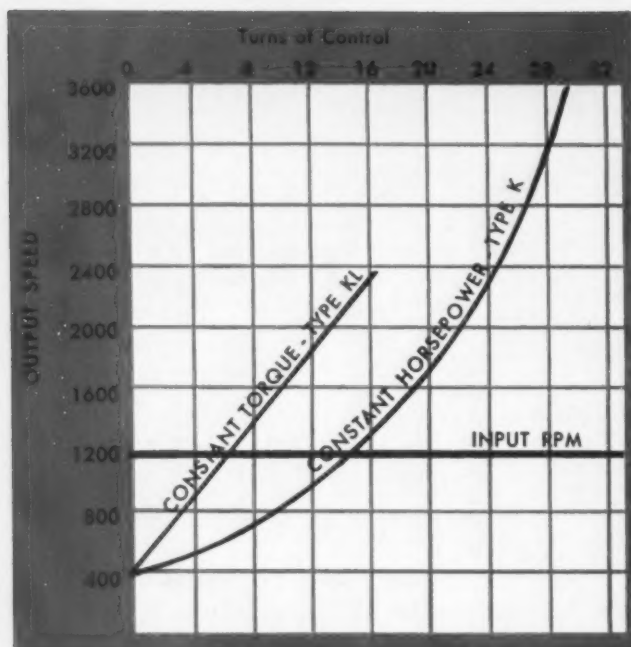
Boosting silicon content of steel alloys AISI 4340 and AISI 4325 to 1.5 pct produces higher tensile strength with no decrease in ductility, recent Government-sponsored tests show. Experiments prove 280,000 to 300,000 psi tensile strengths are attainable with 4340 steel; 250,000 psi strengths in 4325. At 250,000, 4325 steel shows higher notch toughness than 4340. Maximum strength climbs with silicon addition at each carbon content.

Hunt Easier-Machining Alloys?

Auto industry people are considering putting money into research next year on finding new alloy steels, for gear-and-crankshaft use, which would have better machining properties. Electric furnace steelmakers have been arguing the potential savings automakers might realize in tooling and machining; are pushing for formation of a research committee to probe possibilities.

Best Answer For Magnesium Fires

For magnesium fires, chlorobromomethane alone is not a satisfactory extinguishing agent. But Air Force researchers find combining the chemical with a 50 pct solution of the liquids di-isodecyl phthalate or an ethanol makes it the most effective agent tried. Chlorobromomethane forms a combustion-inhibiting film on the metal.



Typical speed regulation curves for the Types K and KL Variators. Type KL offers a linear speed regulating pattern, often an advantage in automatic control applications. Output speed regulation of the Type K Variator follows a geometric progression pattern. Starting at the minimum output speed, each turn of the speed regulating wheel produces a fixed percentage increase in output shaft speed.

The Cleveland Speed Variator is available in 18 models ranging from fractional to 16 HP at 1750 input RPM. Unit shown at right, used in process control, has speed regulating worm driven by 75 RPM synchronous motor, with adjusting shaft indicating mechanism modified to actuate limit switches to prevent overtravel.



CLEVELAND SPEED VARIATOR

**Accurately Provides
Dependable, Infinitely
Variable Speed Control**

ANNOUNCED late in 1954, the new Cleveland Speed Variator met instant, enthusiastic acceptance. Engineers and designers of industrial equipment already have put thousands of units into use on such varied equipment as cigarette making machines, textile machinery, metalworking machinery, pharmaceutical equipment, transfer tables, conveyors and experimental and testing equipment of many types.

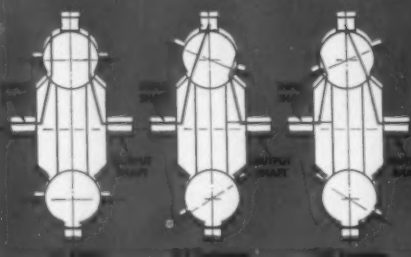
Infinitely variable, the Cleveland Speed Variator gives stepless speed over a full 9:1 range—from $\frac{1}{2}$ to 3 times input speed. Output speed can be adjusted by either a hand wheel on the Variator or by manual or automatic remote control.

The Cleveland Speed Variator offers these major advantages:

1. An extremely compact unit with input and output shafts in line and rotating in the same direction.
2. Almost any input speed up to 1800 RPM can be used—either clockwise or counterclockwise rotation.
3. Rated for constant horsepower output over a 9:1 or 6:1 range; or for constant output torque over a 6:1 range.
4. Speeds infinitely variable over entire range of adjustment.
5. No slippage—positive torque response mechanism adjusts in direct proportion to the loads encountered.
6. Long life and minimum maintenance due to absence of belts or complicated linkages.
7. Ample bearing support for overhung pulleys on both input and output shafts.

Write for Bulletin K-200 for detailed description with photographs, sectional drawings, rating tables and specifications.

HOW THE CLEVELAND SPEED VARIATOR WORKS



Power is transmitted from input shaft to output shaft through alloy steel driving balls which are in pressure contact with discs attached to the two shafts.

Relative speeds of the shafts are adjusted by changing the positioning of axes on which the balls rotate (diagram, right, shows cutaway Variator with hand regulating wheel).

"It's the Drive That's on the Ball."



THE CLEVELAND WORM AND GEAR COMPANY

Speed Variator Division, 3282 East 80th Street, Cleveland 4, Ohio

Sales Representatives in all major industrial markets • In Canada: Peacock Brothers Limited.



Behind The Swing To Sintered Ore

Most major mills are including some form of sinter in blast furnace charges . . . See 15 pct jump in output, coke savings and utilization of ore fines . . . 18 sintering plants under construction—By G. J. McManus.

♦ **AFTER** muddling along for years, iron ore sintering is now getting a concerted push from the steel industry.

Sintering capacity will nearly double by the end of next year. Major mills will convert virtually all their blast furnace charge to coarse ore and some form of sinter. They expect blast furnace output to jump about 15 pct.

In making this switch, the mills will install 18 new sintering machines and increase sintering capacity by 25 million net tons. U. S. Steel Corp. alone has eight sintering machines being built, one just completed, and two more may be constructed.

Bethlehem Steel has four newly-completed sintering lines; will put two more into operation early next year.

Weirton Steel put one sintering machine into operation in January, has a bigger one under construction.

Other Plants

Armco, Great Lakes, Jones & Laughlin and others have big sintering programs going. The figure of 18 new machines includes only units going to mill sites or nearby. Machines are the straight-line traveling grate type. They take ore particles under $\frac{1}{4}$ - $\frac{1}{2}$ inch and fuse them into clinkers up to 5 inches. Unless sintered or discarded, the fine particles clog up a blast furnace and blow off as flue dust.

The sudden importance of sintering comes from a number of forces that have converged hard

on the mills. For one thing, domestic, Labrador and Venezuelan ores are now coming through with over 45 pct fines.

The new Fairless sintering plant, built by Arthur G. McKee, Cleveland, is being worked three turns a day. With a nominal rating of 4000 tons daily, it has the capacity to permit a beneficiated charge for the two existing blast furnaces.

Coke Savings

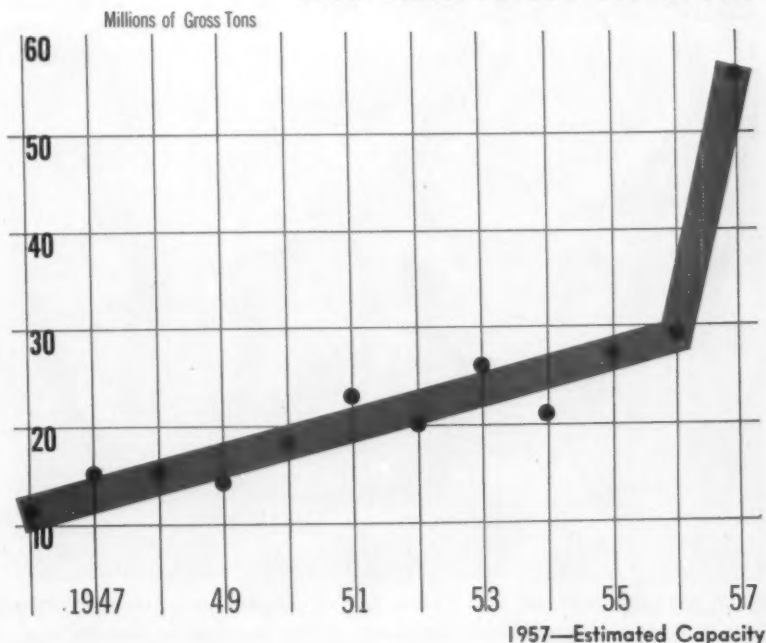
Coke costs have also hurried the swing to sintering. Every increase in the price of coal has increased the savings offered by sintering. It's estimated that a switch from

straight run-of-the-mine ore to straight sinter decreases the coking rate 20 pct.

In actual practice, neither extreme applies and the saving is less; but coke savings up to 16 pct have been recorded at other mills and 10-15 pct savings are expected to be average. The porous makeup of the individual sinter and of the whole charge when sinter is used permits a close mingling of gases with the ore and speeds the reduction process.

These conditions mean some increase in iron output as coke rates are decreased. Reducing action is faster. There are fewer fine particles to be blown up the furnace

How Sintered Ore Use Grows



SPECIAL REPORT

stack. The sintering process drives off moisture, which runs about 11 pct with Mesabi ores.

Efficiency Push

The increase in blast furnace output is, of course, welcome to producers who are short of hot metal and who must pay over \$20 million for a new blast furnace. Sintering machines are not cheap, however. Depending on the amount of auxiliary equipment, costs can run from \$5 to \$10 million. The three-machine, 15,000-ton installation being built by Dravo Corp. for U. S. Steel at Saxonburg, Pa., is reported to cost over \$20 million. The Saxonburg plant will supply sinter to Corporation blast furnaces in the whole Pittsburgh District.

The sintering programs are just one part of a push for more efficient steelmaking through new processing of raw materials. A big portion of the same move centers on the concentrating and pelletizing of low grade ore (IRON AGE, April 12).

The fusing of concentrates seems to be shaping up as a job to be done at concentrating plants. One reason for this is that concen-

trates run down to 230 mesh and present shipping problems. Car bottoms must be tight or the particles leak out. Also, the small sizes of concentrates make them more adaptable to fusing into pellets. At mill sites, sintering lines are being set up for the most part to fuse particles into a solid agglomerate.

However, the lines are not clearly drawn between the handling of concentrates and of fines. Jones & Laughlin now is fusing about 200,000 tons of concentrates on plant sintering lines. And J&L has fused concentrates into large clinkers as well as into clinkers formed of joined-together pellets. Benson mine concentrates used by J&L are unusually coarse, however. They run 20 mesh for magnetite and 12 mesh for martite.

Sure Thing

At another mill, early tests with concentrate pellets were not satisfactory; only the outer shells were fused and the pellets broke down in the blast furnace. As a result the mill began a sintering program of its own. Recent statements indicate pelletizing problems have been licked:

"We are getting all the good things from taconite concentrate that we had expected," says Charles White, Chairman of Republic. W. W. Sebald, Vice Chair-

man of Armco, says "... pellets from taconite no longer represent an uncertain experiment."

Bugs Still Exist

On sintering, there are still questions to be resolved. Most of the new sintering systems conform fairly well in their general outlines but difference in thinking and conditions bring a wide variance in detailed mechanics at different mills.

For its new Gary sintering plant, U. S. Steel will screen Mesabi ore before it is delivered. At Saxonburg, the sintering plant will be equipped with a full screening system and handle domestic and foreign ores. At Fairless, Venezuelan ore will go through an integrated screening facility.

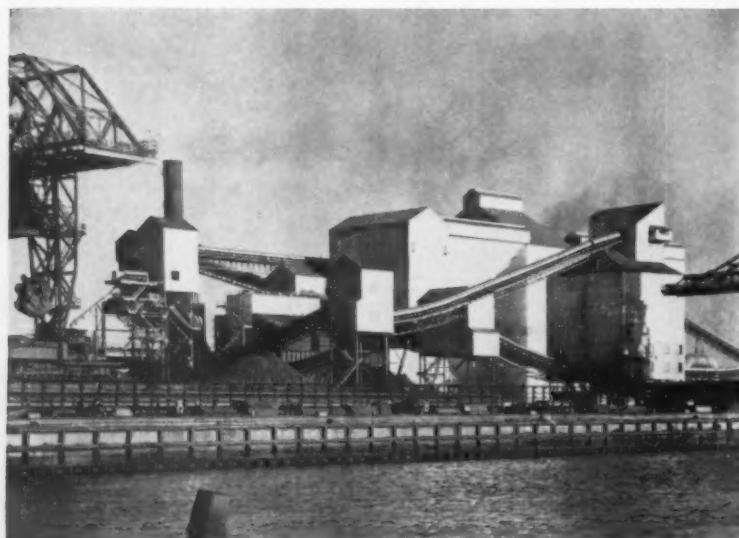
In the screening operation, fine particles are separated from coarse lumps in successive steps. The ideal cutoff point is believed to be about $\frac{1}{4}$ in. But with wet ores, screens become clogged if the mesh is too fine. U. S. Steel is running Venezuela ores through $\frac{1}{2}$ in. screens; Mesabi through $\frac{3}{4}$ in.

The problem of clogging is a serious one because particles over 1 in. do not sinter well. Jones & Laughlin, which screens all its ore prior to shipping, is combating moisture by casting (bulldozing) ore to dry it; by using heated screens; and through the use of separators employing rubber-mounted rods. J&L is sticking to a $\frac{3}{8}$ in. separation.

Limestone's Role

After screening, ore fines go by conveyor to bins. From these they are drawn off as needed and mixed with coke breeze and iron salvaged in the form of mill scale, flue dust and washer sludge. At Fairless the whole feed operation can be automatically geared to the flow of ore fines. The amount of coke must be closely controlled: too much will give an overburned sinter; too little, a weakly-bonded sinter. If openhearth sinter is needed, the additions of roll scale and coke are increased to produce a dense, hard product.

There is a lot of discussion now



NEW sintering plant at U.S. Steel's Fairless Works takes ore right from barges, and discharges sinter practically at the base of a blast furnace.

on the role of limestone in sintering. Quantities can be added to speed up the fusing action and reduce the amount of coke needed. In Sweden, the Domnarfvet Iron & Steel Works has been using a pre-fluxed sinter since 1942. An English mill is now working along the same lines.

Rotary Discing

One of the objections to limestone is that it turns to powder on cooling and tends to break up the sinter. Use of smaller limestone particles is reported to reduce this action but there is still a question whether the care required in the use of a fully pre-fluxed sinter is justified in this country now.

When all the sinter elements have been added, the mix goes by conveyors to a pug mill for mixing and from there to a rotary drum for balling. Ordinarily the mix is rolled into loose seeds.



ONE trip on the merry-go-round cools sinter for storage. Shovel will remove sinter to ore yard.

However, the drum pitch can be varied to produce a clearly defined pellet. Rotary disc machines, used in place of drums, are claimed to give a more uniform pellet.

In the feeding of the sinter mix onto the hearth, swinging spouts, vibratory feeds or roll feeds are used. The relative merits of these are open to discussion, with some claiming that roll feed gives a

Where New Sintering Machines Are Going

Builder	Company	Location	Capacity (Tons)	Number
McKee	U. S. Steel	Fairless	4000	1
Dravo	U. S. Steel	Saxonberg	5000	3
Dravo	U. S. Steel	Gary	5000	3
McDowell	U. S. Steel	Ohio Works	5000	1
McDowell	U. S. Steel	South Works	5000	1
Bethlehem	Bethlehem	Sparrows Pt.	2000	6
Koppers	Weirton	Weirton	6000	1
Koppers	Weirton	Weirton	2500	1
Dravo	Armco	Ashland	2400	1
Koppers	Armco	Houston	1400	1
Koppers	Great Lakes	Detroit	7000	1
McKee	Jones & Laughlin	Cleveland	2500	1
	Other		2500	1

more level bed on large machines.

The sinter mix is ignited by flames, which play down on it. Ordinarily, coke gas is used, which is one of the advantages of having facilities near the mills. In the International Nickel sintering operation at Copper Cliff, Ont., the sinter is fused entirely by the furnace heat. The ordinary method is to have heat supplied by burning coke.

The ignited mix travels from the furnace down an open line. Air is sucked through the mix, which burns downward. At Fairless, a 3000 hp fan can draw over 400,000 cu. ft per min. Current thinking is that compacting action of the air draft limits the gains that come from increasing suction power.

Chrome Alloy Used

The travel speed of the sinter hearth and the amount of coke present are aimed at bringing the sinter to the end of the line just as it becomes fused all the way through. If the mix overburns, the excess heat can warp grate bars. At Fairless and in other installations, this danger is being reduced by feeding a layer of previously sintered material onto the grate bars. Chrome alloy bars are also being used in place of cast iron or low alloy bars for the same reason.

Coming off the line, sinter is in the form of a solid agglomerate. It is broken down to lumps under 5 in. and the smaller particles are recycled to the sintering machine.

At Fairless, everything under $\frac{3}{8}$ inch is recycled.

After being chopped up, the sinter is cooled by air or by water. Feeling in some quarters is that water cooling has a shattering effect on the sinter, particularly on the high limestone grades of Alabama.

Major Mills Sold

The whole process is not new. There are now 103 sintering machines in America. But most of these are units under 2000 tons and designed for sintering flue dust rather than ore. There was a spurt of sintering activity during World War II but interest died down after the war. As late as 1955, American mills consumed only 27 million tons of sinter. This compares with 34 million tons used by Russia, which has less than half our steelmaking capacity.

But now all the major mills appear sold on sintering. Koppers Co., Inc., Pittsburgh, is building for Great Lakes Steel a machine that will turn out 7000 tons of sinter a day (biggest U. S. single machine). Koppers, which maintains a sintering laboratory, is also building a 6000 ton machine for Weirton Steel and a 1400 ton unit for Sheffield Division of Armco at Houston.

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ROADBUILDING: Steel Needs Pick Up Speed

Federal and state highway programs are seen requiring almost 49 million tons of steel in next 13 years . . . Structural steel expected to make up half of total . . . Getting enough wide flange shapes may be tough.

◆ **WHEELS** are beginning to turn faster in the federal and state program to convert huge quantities of steel and other materials into thousands of miles of broad new highways.

By 1960, when the giant new road building program is rolling along in high gear, dollar outlays will be about 75 pct ahead of the 1955 level of spending for roads. Steel needs (see table) for the period 1957-69 are estimated to be over 48 million tons.

Officials of the U. S. Bureau of Public Roads, who have been keeping check on the quantities of vital materials consumed in previous highway jobs, forecast a requirement of more than 3.3 million tons of steel for all public road construction in '57. Tonnage is larger than the '56 total by some 600,000 tons.

Three Million Ton Average

Direct steel use is not going to fall below the 3.3 million ton mark in any year through 1969, when the interstate chain is to be intact, while primary, secondary, and urban road building will continue. For the next 13 years, the full "take" of structural, reinforcing, and miscellaneous steel and corrugated metal pipe will add up to nearly 49 million tons.

Structural steel makes up more than half of this total, with a need for 25.7 million tons forecast through 1969. Bar and wire reinforcing steel requirements will amount to 16.6 million tons. Also listed for use are 3.4 million tons of miscellaneous steel (guard rail, fences, cast iron pipe, pavement joint devices, tubular piling, nails) and approximately three million tons of corrugated metal pipe.

Biggest supply problem in the steel line, as the BPR sees it, will be providing enough wide flange structural shapes to meet highway demands. For 1957 alone, there will be a call for 809,000 tons, and for each of the years 1960-67 the consumption is figured at 944,000 tons. Over the coming 13 years, the total is to be 11.8 million tons of wide flange shapes.

Concrete to Substitute?

As the government realizes, making this tonnage available for highways will be a serious task for the producers, in view of the continuing high rate of other construction activity. If increases in steelmakers' capacity to turn out the shapes leave a deficiency, says the BPR, more reinforced concrete, prestressed concrete, and fabricated plate girders will have to be brought into the program.

Work on the 41,000-mile interstate road system that will offer unimpeded driving for through traffic in all parts of the country consists mainly of planning activ-

ity, thus far. BPR, chief government agency in the highway field, reveals that \$1.8 billion in projects on this major network have been programmed since July 1.

Sound Start

Awards to get the work done are comparatively slight, at \$67 million worth, compared with the \$27.6 billion estimated as the cost of completing the interstate net. But the start made this year will provide a sound underpinning for rapid assignment of projects in 1957, seen as the first really big year of the new program.

Northwest Wants Steel

Pacific Northwest's cry for steel is louder than ever. Today's consumption is over one million tons per year—up from 625,000 tons in 1949. Some relief is in sight.

U. S. Steel will increase its Columbia-Geneva capacity by 380,000 tons next year. The Pacific Northwest has a promise of a good portion of it.

Roadmakers Blueprint Steel Requirements

Material required (in thousands of tons)

	1955	1957	1958	1959	1960	1961-69	Total
Steel, all types, total	2,720	3,332	3,625	3,779	3,885	34,116	48,737
Structural steel, total	1,442	1,760	1,914	1,996	2,052	18,015	25,737
Wide flange shapes	663	809	880	918	944	8,288	11,839
Standard shapes	303	370	402	419	431	3,783	5,405
Bearing piles	144	176	191	200	205	1,800	2,572
Sheet piles	43	53	58	60	62	543	766
Wide plates	87	106	115	120	123	1,080	1,544
Standard plates	202	246	268	279	287	2,521	3,601
Reinforcing steel, total	931	1,136	1,236	1,288	1,325	11,632	16,617
Bar	745	909	989	1,030	1,060	9,306	13,294
Wire	186	277	247	258	265	2,326	3,323
Corrugated metal pipe	165	201	219	228	234	2,056	2,938
Other misc. steel	182	235	256	267	274	2,413	3,445

Source: U. S. Bureau of Public Roads

MACHINE TOOLS: Tight Money Hits Market

Rentals and leasing boom as capital shortage hits machine tool users . . . Renters report big jump in business . . . Builders take a second look at leasing programs . . . No quick easing ahead—By K. W. Bennett.

♦ **THE GROWING SHORTAGE** of capital is having a significant effect on the machine tool market.

In a period of boom, businesses that would normally be making heavy expenditures for machine tools are extending payments, boosting their rentals of machine tools, or hunting for leasing or long-term payment arrangements.

Rental Booms

Machine tool rentals are one of the first indications of the shortage of money for outright purchase of capital goods. Emerman Machinery Corp., which began renting machine tools in 1948 and with a 1500 tool stock is one of the nation's larger tool rental firms, reports that first half 1956 has exceeded the entire year of 1955 in volume. More important, where outright sales were double rentals in 1955, the figure for 1956 has reversed itself.

Main sources of the demand for rental tools are auto parts producers who have been subcontracting work, but now prefer to rent tools because of lack of working capital or uncertainty of a continuing market. The unprecedented wave of plant expansion of the past two years has boosted rentals, as well. With capital reserves low, expanding businesses are hoarding their remaining stocks of ready cash and renting tools to get into early production in the newly constructed plants.

Industrial associations report a steady increase in demands for information on machine tool leasing and long-term purchasing in a growing volume since last June.

Machine tool leasing has been regarded askance by many machine tool builders for several years, yet in the past 30 days at least two have called in their sales

forces to decide what to do about the advancing wave of lease inquiries. In several instances, the lessor has been reluctant, is not selling leasing and is even discouraging it. But these same sources will admit the leasing pressure is continuing to grow—primarily due to the capital shortage.

A tool builder with no leasing program reports the volume of customers badly in need of cash and who would have to go on extended time payment program has been climbing since as early as June of this year. Four out of five nonleasing firms queried report similar credit extensions.

The Facts

Kearney and Trecker leasing, which picked as early as June of this year, reportedly has advanced the total number of units on loans by 25 pct in the past three months. Gisholt Machine reports extended payments were up 8 pct in the first nine months of 1956, have advanced 77 pct beyond this figure in contracts scheduled for the remaining three months of this year.

Another large Midwestern builder with no full-scale leasing program has been extending payments for tools since July, sought the aid of a large financial credit house in assuming the debt burden, and finally gave up when the money lending firm indicated only a very cool interest.

Where will expansion money come from? The big tool builders are still in strong credit position, can assume a fair amount of the credit burden. But sources of commercial credit are drying up. C.I.T., one of the biggest, saw its cash in hand dwindle by \$7,000,000 this year while accounts receivable advanced from \$1,690,785,000 to \$2,020,138,000. Walter E. Heller & Co., a rapid grower in the industrial loan field, has advanced its cash position by about \$200,000 in a period when its receivables have advanced from \$140,334,000 to \$153,000,000.

Though most loan houses say they have plenty of cash for loans, most are picking their new clients with extreme care, as small industrial firms are finding out in increasing numbers daily.

Short Term Business Loans Hit Top

■ Short term loans obtained from New York City banks brought an average of 4.14 pct interest in September. This is the highest rate since August, 1932.

■ Borrowers could get some comfort from the fact that the rate is still below the 6 to 7 pct charges that were the rule back in the 20's, the New York Federal Reserve Bank reports.

■ The September rate was a ¼ point jump over the rate for June of this year and 2/3 of a pct over the rate a year ago.

■ But the number of loans granted was down. Reporting banks granted 2980 loans the first two weeks of September this year, compared with the 3630 granted the same period in June.

ALUMINA: Can Anaconda Make Clay Pay?

Plans to extract alumina from clay sparks a controversy in the aluminum industry . . . Critics insist it can't be done at competitive costs . . . Anaconda betting \$1 million on the process.

◆ A SHARP DIFFERENCE of opinion has opened up in the aluminum industry over decision by the Anaconda Co. to put \$1 million into commercial development of its alumina-from-clay process.

There is still plenty of bauxite in the Caribbean and West Africa. And as long as there is any bauxite available, the other side declares, it will be cheaper to go half way around the world for it than to extract alumina from clay.

However, the converse is exactly what Anaconda intends to do. The company has announced that after two years of intensive work it has perfected the alumina-from-clay process. Now it will spend the \$1

million to set up a pilot plant with a capacity of 50 tons of alumina per day, with a view toward future expansion to a capacity which would furnish all of the company's requirements.

Can Be Done

The alumina-from-clay process itself provides no grounds for disagreement. It definitely can be done, say Anaconda's critics. But they can't see how costs can be kept at commercially-competitive levels.

For one thing, more refining agents are required with clay. To derive one pound of alumina from anorthosite clay, 12 lb of soda, limestone, and fuel are required. With

bauxite, one pound of refining agents will do the same job.

And the yield is lower. It takes four pounds of clay to get one pound of alumina. Two pounds of bauxite give one pound of alumina.

One possibility for keeping costs in line might be a combination of by-products, savings on freight hauling, and material cost. For example, the oil shale clays of Washington would yield oil as well as alumina.

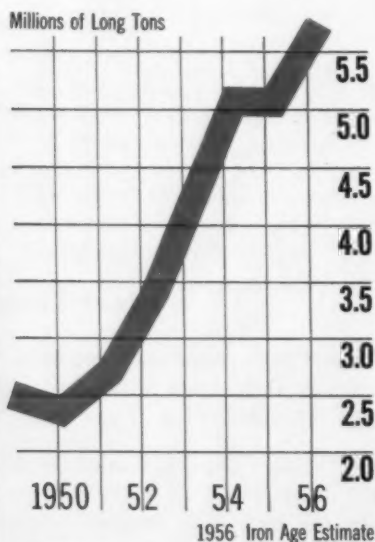
The location of Anaconda's clay, Moscow, Idaho, is near the Washington state line, which might indicate a plan to use this type of material and with this by-product aim. However, other authorities contend that an economical alumina plant would have to turn out two million pounds per day, and they don't believe there is enough oil clay here, or in any one spot, to support this type of operation for any length of time.

How About Cement?

Another possibility would be the production of cement from refining residues. Large amounts of calcium silicate are left when alumina is extracted from clay. Consideration was given to this in a government sponsored project at Laramie, Wyoming, during World War II. This was then considered commercially unsound because, for one thing, about 10 pounds of cement are produced for every one pound of alumina, at locations which are far from consuming areas. Critics readily admit that the current road-building program and the shortage of cement may have changed the economy of the situation.

Anaconda is keeping mum about details of its decision to switch to clay for the alumina it requires. At present the company buys its entire supply from a nearby Rey-

U.S. Imports More Bauxite



BAUXITE conveyors in the Caribbean like this Kaiser Aluminum unit, are operating at capacity to push U.S. imports still higher.

Source: U. S. Bureau of Mines

nolds' metals plant, which might be a factor.

It is logical to assume that Anaconda investigated the possibility of mining its own bauxite in the Caribbean. However, it is no secret that the major aluminum producers in this hemisphere have options on just about every square foot of land in the area which contains any appreciable amount of bauxite.

Both Are Tough

Working with clay and working with the bauxite deposits in the U. S. differ very little in so far as there is difficulty modifying existing processes. Domestic bauxite contains a greater amount of undesirable silicates which requires added time, effort and expense to eliminate.

Aluminum Co. of America, for one, reports that it has no specific program directed at refining clay, but is giving very serious consideration to more extensive use of lower grade bauxite. It currently takes about 70 pct of the alumina in the bauxite out by the universally utilized Bayer process. To salvage the remaining 30 pct from the bauxite mud requires a sintering process using refining agents similar to those used to take alumina from clay.

Alcoa had at one time considered a European developed acid method for extracting alumina from clay, but decided it was impractical.

During the Korean conflict, when aluminum was in short supply, Aluminum Co. of Canada built a special addition to its giant Arvida Works to extract the additional alumina from the residue of the regular refining process. However, the company has since abandoned this facility as competitively uneconomical to operate.

Another Answer

Another company, about to enter the field of primary aluminum production, evidently encountered the same problem as Anaconda with respect to getting options to mine its own bauxite. Its answer was to sponsor an amendment to the bill which provides for suspension of duty on bauxite, to include alumina as well, and then to contract for its requirements from Japan.

ATOMIC ENERGY

ISOTOPES: Their Use Is Growing

Metalworkers rank high among industries putting radioactive isotopes to work . . . Major applications include gaging, thickness control and radiographic inspection.

♦ **ATOMIC POWER**, perhaps most dramatic of peaceful applications, may still be in the development stage, but radioactive isotopes are already playing a major role in the manufacture of everything from cigarettes to machine tools.

Over 1000 industrial firms are now using atomic energy by-product materials in 1347 installations, a recent survey by Atomic Industrial Forum shows. This use by industry has increased more than 500 pct within the last 5 years, according to the report.

Widest use of the isotopes, supplied by the Atomic Energy Commission, is in gaging and control. Over 400 firms are using the isotopes for gaging, with over 300 applying them to thickness control. Products so controlled include roofing and flooring materials, paper, steel, textiles, rubber, plastics, glass and cigarettes.

Inspection Use High

Second largest use for the isotopes is in radiographic inspection particularly of weldments and castings. About 350 companies are now employing the isotopes for such inspection. AEC

estimates that these and other radioisotope applications are currently saving industry \$200 million annually, and will reach the \$1 billion mark within the next 10 years.

Other major applications, although smaller than gaging and inspection, include utilization of radiation effects, luminescent materials and phosphors, and manufacture of ionization sources.

Research, development and testing organizations account for the largest number of user organizations, according to the report's study of use by industrial classifications. Following, and rather closely, are manufacturers of electrical equipment, electronics and instrumentation, with the metalworking industry a hot third. Other large user groups are paper and plastic, chemical and petroleum industries, general manufacturing and machinery. It's worth noting that a category "organizations not listed in standard industrial indices" is the fourth largest group.

Survey was compiled by the Forum from records maintained by the Isotopes Extension of Division of Civilian Application of the AEC.

Metalworking Puts Atom To Work

■ **METAL** firms, third among industrial users of radiographic isotopes, are putting the atom to work in these applications:

Steel: activation analysis of metallic impurities, localization of slag inclusions, radiographic inspection, removal of hydrogen, thickness control, segregation and diffusion of impurities, and tracer studies of alloys.

Nickel: analysis in complex mix-

tures, diffusion and crystallization in alloys, effect of alloying constituents on use as radiation shield, and thickness control.

Iron: activation analysis, diffusion and crystallization in alloys, radiographic method for determining disposition of carbon, and sintering of ore.

Aluminum: absorption studies, activation analysis, radiation effect, hydrogen removal.

FOUNDRIES: Molding a Bright Future

Sales of \$3 billion on an all-time record of 15 million tons in prospect for '56 . . . Trend is toward faster, high production methods . . . New developments include CO₂ hardening and shell molding.

◆ **TARGET** for gray iron foundries this year is an all-time record of 15 million tons and association leaders think they have their best chance in a long time to make it. The present record is only a shade short—14.9 million tons—in 1951. And last year they came close at 14.8 million.

Estimated total sales for '56 are seen as \$3 billion if the production figure of 15 million tons is realized. Last year's sales for the approximately 2400 foundries were \$2.9 billion. Shipments in 1954 were worth \$1.4 billion, compared with \$1.2 billion in 1947.

A high degree of mechanization is indicated because production records are being set with fewer

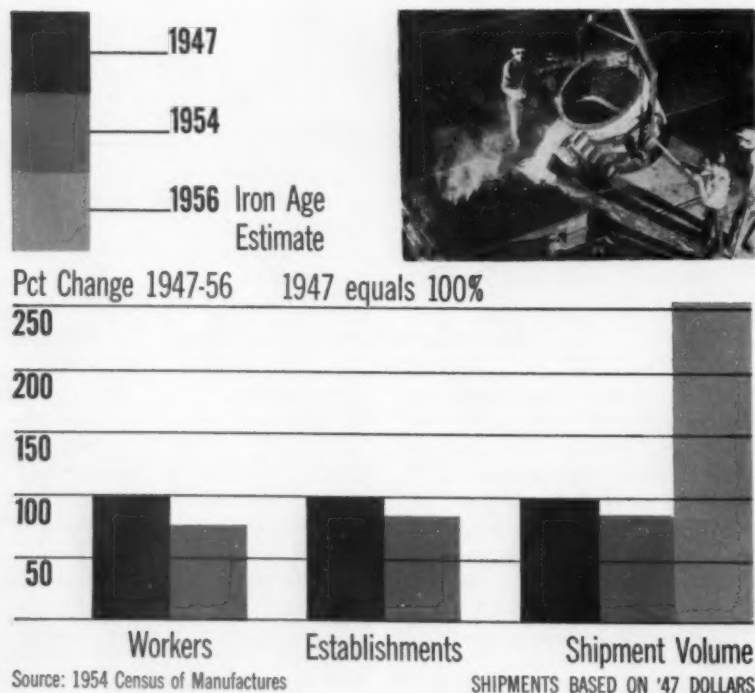
employees and fewer plants. Trend is highlighted in new statistics on the 1954 Census of Manufactures of the U. S. Dept. of Commerce. For the gray iron foundry industry this indicates that in 1947 there were 173,813 foundry workers who turned out products of \$732 million in value added by manufacture. By 1951 the number of workers dropped 23 pct to 133,884 but they piled up \$846 million added manufacturing value, an increase of 15 pct. Number of foundries has also decreased 15 pct in the period from 1655 to 1947 to 1413 in 1954.

The answer is that the big foundries are getting bigger and the small ones are becoming more

highly specialized or non-competitive. Thus the industry is working for continually faster, high production methods to keep selling prices per unit down.

The foundry industry today is buzzing with technical improvements. Biggest advance in the last year has been the CO₂ process for hardening cores and molds without drying ovens, thus increasing capacity without additional large size investment. Increased interest in shell molding is also raising the level of sand molds and use of nodular and pearlitic malleable iron in automotive crankshafts. And a real dark horse is a new alkaline earth haloid process recently introduced by Allis-Chalmers for lower cost production of nodular iron.

Changing Picture For Foundries



CO₂ Process Gains

The Gray Iron Founders Society estimates that about 500 foundries in the U. S. are now using the CO₂ process compared to about 50 a year ago, most of whom were then just curious. The process is ideally suited to jobbing work although there are some problems which occur in cleaning cores and in removing them from the completed casting. It is also used for making dry sand molds.

Shell molding is becoming increasingly popular and also raising quality standards in conventional sand mold work. The fine finishes being obtained through shell molding spur foundrymen to use finer, higher quality sand to emulate the shell molders.

Reprints of this article are available as long as the supply lasts. You may obtain a copy from Reader Service Dept., THE IRON AGE, Chestnut & 56th Sts., Philadelphia 39, Pa.

Handling:

Benefits and savings of new methods must be sold.

With all the recognition materials handling has gained in recent years, production people still must do a selling job if they are to keep materials moving faster.

This theme is being hit hard by materials handling men. It's not enough to come up with a good handling idea, they say; you've got to merchandise your project. Referring to industry's \$3 billion materials handling tab, Pittsburgh Steel's Robert Lohman put it this way:

"It's not money industry likes to spend. Materials handling is a necessary evil. It increases a product's cost but in no way its quality."

Manager of materials handling sales for Pittsburgh Steel Co.'s Products Div., Mr. Lohman made his remarks at a clinic conducted by National Metal Trades Assn. The session was one of a cross-country series being staged by NMTA in conjunction with its new materials handling consulting service.

Stress Savings

Earlier clinic speakers made the same point. At Cleveland, Towmotor Vice President R. L. Fairbank said materials handling recommendations "must contain some indication of the possible savings to be effected." Mr. Fairbank says evaluation should not stop at labor savings; these are important and critical in the current labor market. But they don't tell the whole story.

Reduced inventory can be a big item, says Mr. Fairbank. If better material flow permits a \$3 million reduction in inventories, there is a direct interest saving of \$180,000.

Space savings are also important, he says. With plant space costing 30¢ a cubic foot, a 400,000 cu ft storage room represents a \$120,000 capital outlay. If stacks are limited to the height a man can reach and the ceiling is 20 ft., a forklift truck might release 200,000 cu ft and save \$60,000.

PRODUCTION

FASTENERS: Room to Improve

Market for fasteners has some soft spots . . . Producers vary from only fair to top production . . . Delay in automotive orders puzzles industry . . . Aircraft demand good.

◆ **DEPENDING** on who the big customers are, the industrial fastener business is ranging all the way from fair to middlin' to good.

Since they go into almost the whole metalworking field and hold most of its products together in one way or another, fasteners are a good business indicator. They are ranging from only 65 pct of capacity output by one major producer to equalling last year's all time high for another top company. From the fastener standpoint the customers line up about as follows:

The Picture

Automotive: Still awaiting full fourth quarter impact of auto production orders. Shipments about 5 pct under last year and incoming orders off a conservative 15 pct from last year. Much hinges on success of new models and outlook is generally firm to mid-year at least.

Aircraft: Production steady and increasing with outlook good. But increasing portion of the business going to new specialty firms with some old-line fastener producers dropping out. Total outlook firm and shipments good but heavy accent going into development of new more highly specialized types.

Hardware: Jobber inventories swollen due to price hedging and so new orders down as much as 30 pct until inventories are eaten up.

Farm Implements: Dragging until farm income shows increase. Shipments and orders little changed from year ago.

Railroad: Outlook excellent due to continued heavy carbuilding program but limited by availability of steel plate to supply it.

Roadbuilding Equipment: Steady shipments and outlook

good for expanded highway program.

The heavy tonnage general hardware trade and automotive fields seem to be about the softest spots in the fastener business at the moment. Some producers are running at only about 65 pct of capacity and are fighting swollen inventories in the hands of jobbers who laid in heavy stocks to mid-year in anticipation of the steel price rise and found a soft market afterward. Fasteners for 1956 cars are dragging at least 5 pct behind a year ago. A heavy fourth quarter is anticipated, but insufficient to make up dropoffs of about 15 pct in order intake.

No Rule of Thumb

Specialty producers supplying industry directly seem to be in better position than the bulk of general line firms, although the tonnage they represent is lesser. Yet Lamson & Sessions of Cleveland, with one of the widest ranges of fasteners, expects this year will be only a shade behind last, which was the best in 90 years.

Aircraft orders continue at good volume but some of the largest fastener producers are finding it unprofitable to try and compete with specialty firms. One of the largest U. S. producers, Russell, Burdsall and Ward has shied away from aircraft fasteners. Arrow Supply Co. has recently dropped its aircraft line. National Screw & Mfg. Co. and Lamson & Sessions continue as large general line fastener producers with strong hand in the aircraft field.

For the specialists, the aviation field has in many cases more than made up for the dropoff in automotive orders.

TRADE FAIRS: Road to Foreign Markets

Commerce Dept. will sponsor exhibits and trade missions on a permanent basis . . . Industry is asked to supply the equipment and manpower . . . 8000 sales leads in 1955—By F. J. Starin.

◆ **INCREASED** sales for U. S. industry are an important by-product of official U. S. participation in international trade fairs.

Although 1955 was only the second year in which this country has been active, information centers at these fairs handled more than 60,000 inquiries. About 8000 could be referred directly to U. S. exhibitors as specific opportunities to do business.

Secretary of Commerce Sinclair Weeks points to this as indication that American companies which participate can count on a "growing European market for American exports."

Theme

All preparations are tailor made for each fair, but usually American participation includes (1) central exhibit sponsored by the Commerce Dept., (2) individual displays put on by private companies, and (3) trade missions, which consist of business men who volun-

teer their services, gratis.

When a particular fair is selected for official U. S. representation, the Office of International Trade Fairs, Dept. of Commerce, chooses a theme, such as "What's New" used in Vienna, Austria fair, or "America at Home," Zagreb, Yugoslavia. A designer and fair manager are chosen from a number of competitors to carry out the theme. This work begins about 18 months prior to the fair.

Manufacturers can be kept posted on prospective fairs and themes through OITF. The best method for volunteering equipment or ideas is through a trade or industry associations.

If your product is accepted for display with the central exhibit you will be expected to see that it arrives at the port of departure intact and on time. OITF will then assume responsibility and pay transocean freight. If major assembly is required you may be asked to supply a technician.



U.S. EXHIBITS, like this Lionel electric train, at the Bangkok Fair, convinced the Russians that there was no sense in unpacking their display.



TRADE mission, under picture of a French gift to the U. S., answers questions of French businessmen at a recent Paris Trade Fair.

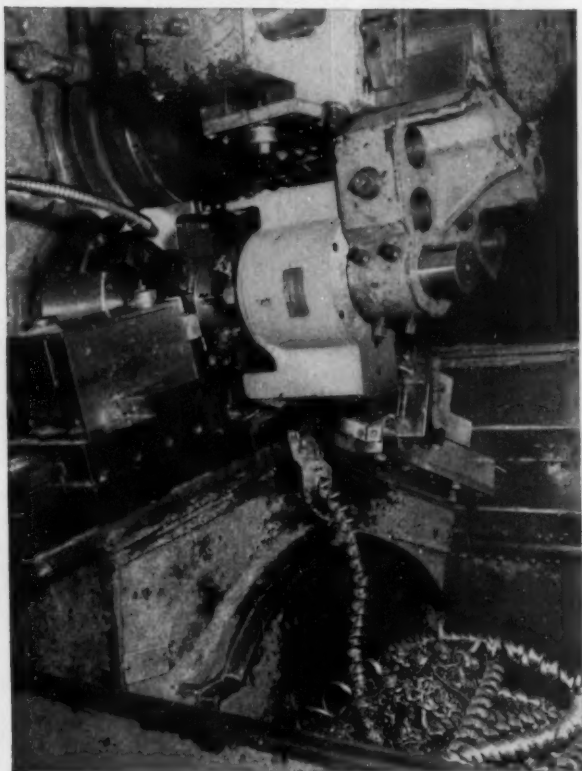
To sponsor an individual exhibit, contact the fair committee in the particular country. Notify OITF and your name and product will be included in the trade information center.

Makes It Possible

Trade missions may operate as the exclusive U. S. representatives in small fairs, or in conjunction with an exhibit. Businessmen selected as members are briefed by government agencies, supplied with a kit of documents and backed up by an extensive commercial reference library.

A bill passed by Congress and signed by the President, this year, authorizes the Commerce Dept. to participate in international trade fairs on a permanent basis. The original program was launched two years ago with money from the President's emergency fund for international affairs.

12-minute lathe and drill press job cut to 2¾ minutes on Warner & Swasey 2AC Automatic



OTM CORPORATION, Houston, Texas, manufactures a variety of sizes and types of flanges for joining pipe such as used in the oil and chemical industries. Machining operations have been handled on a number of turret lathes and drill presses until recently, when five sizes of flanges were transferred to a new Warner & Swasey 2AC Automatic Chucking Machine.

Previous job time on a 1½" 150-pound lap joint flange was 12 minutes, and required two operations—machining the face and drilling four holes on the bolt circle. Now the entire job is done in one operation on the 2AC in 2¾ minutes!

The adaptability of this automatic to all kinds of work is demonstrated in the tooling required for this job. A multiple drill head for drilling the bolt holes is mounted on the pentagon turret. It is driven by an extension arm which shocklessly engages a dog on the face of the chuck, when the turret is traversed at a reduced rate toward the chuck. Once engaged, the speed and feed are raised to the proper rate for drilling.

Facing the flange requires that no withdrawal spirals are left, which would cause pressure leaks. This is accomplished on the 2AC with a retractable facing block on the front cross slide which relieves the cutter on the return stroke.

A somewhat universal setup is used for the five flanges produced, so setup or changeover time is under an hour. It's merely a matter of setting cutters to size, and adjusting trip dogs on the 2AC's speed and feed selector and cycle control drums.

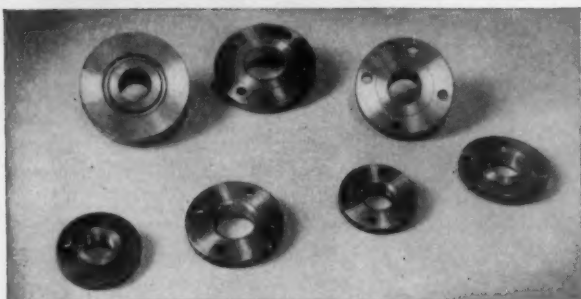
Fast, automatic machining, flexibility, and the quick, easy setup of Warner & Swasey Single Spindle Automatics ideally suit these machines to many small lot, so-called "turret lathe" jobs. Our Field Representative can soon tell you whether you can handle jobs in your own plant faster, with extreme accuracy, and more profitably on these automatics. Call him in.



WARNER & SWASEY AUTOMATIC CHUCKING MACHINES

1 AC 8" or 10" Chuck
6" Working Stroke

2 AC 10" or 12" Chuck
9" Working Stroke



YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS...WITH A WARNER & SWASEY

EXPANSION IN INDUSTRY

Pipeline:

FPC Okays Texas Eastern's \$82 million project.

Texas Eastern Transmission Corp. received the go-ahead signal from Federal Power Commission for an \$82,700,000 expansion program involving importation of natural gas from Mexico.

The commission also set Oct. 29 as the date for hearings on the second phase of Texas Eastern's expansion program—reconversion of a major segment of the Little Big Inch line to petroleum products service.

Including \$64 million the second phase will cost if approved, the entire program will total \$147 million. Construction already has begun on 422 miles of 30-in. pipeline from McAllen to Vidor, Texas; 45

miles of 24-in. pipe connecting the company's existing line near Provident City with the new line; and loops totaling 77 miles at various locations along the system.

Completion is scheduled for fall, 1957.

Plans Securities Sale

Public sale of \$6.5 million in securities has been proposed by Barium Steel Corp., New York. The company will use part of the proceeds for plant improvements and additions.

Barium has asked the Securities and Exchange Commission for its approval in registering the securities, consisting of 5½ percent convertible debentures due 1968. About \$3 million expected from the sale will be used for improvements and additions to the Phoenix Iron & Steel Co. plant and for

additional equipment and other changes at the Phoenix Bridge Co. plant.

Tractor Plant for GM

Euclid Div., General Motors Corp., is planning construction of a 582,500 sq ft tractor plant at Hudson, O., which will provide work for 1500 employees. The 440-acre site is located 35 miles southeast of Cleveland.

Ground will be broken early next summer, according to R. Q. Armington, general manager. When completed, it will enable Euclid to build its new TC-12 tractor under one roof.

Expansion Briefs

Lindburg Industrial Corp., Chicago, has been awarded a contract by Ford Motor Co. for 14 gigantic field-erected aluminum reverberatory type furnaces for Ford's new aluminum plant at Sheffield, Ala.

Advance Stamping Co., Detroit, moved into its new plant in the same city; allows space for a 25 pct production increase.

Ingalls Industries, Birmingham, has completed its three-year, \$9 million expansion.

Armco Steel Corp., Middletown, O., is seeking fast-tax amortization from the U. S. for its \$42 million expansion program; includes increase in basic steelmaking capacity, and of rolling and processing facilities.

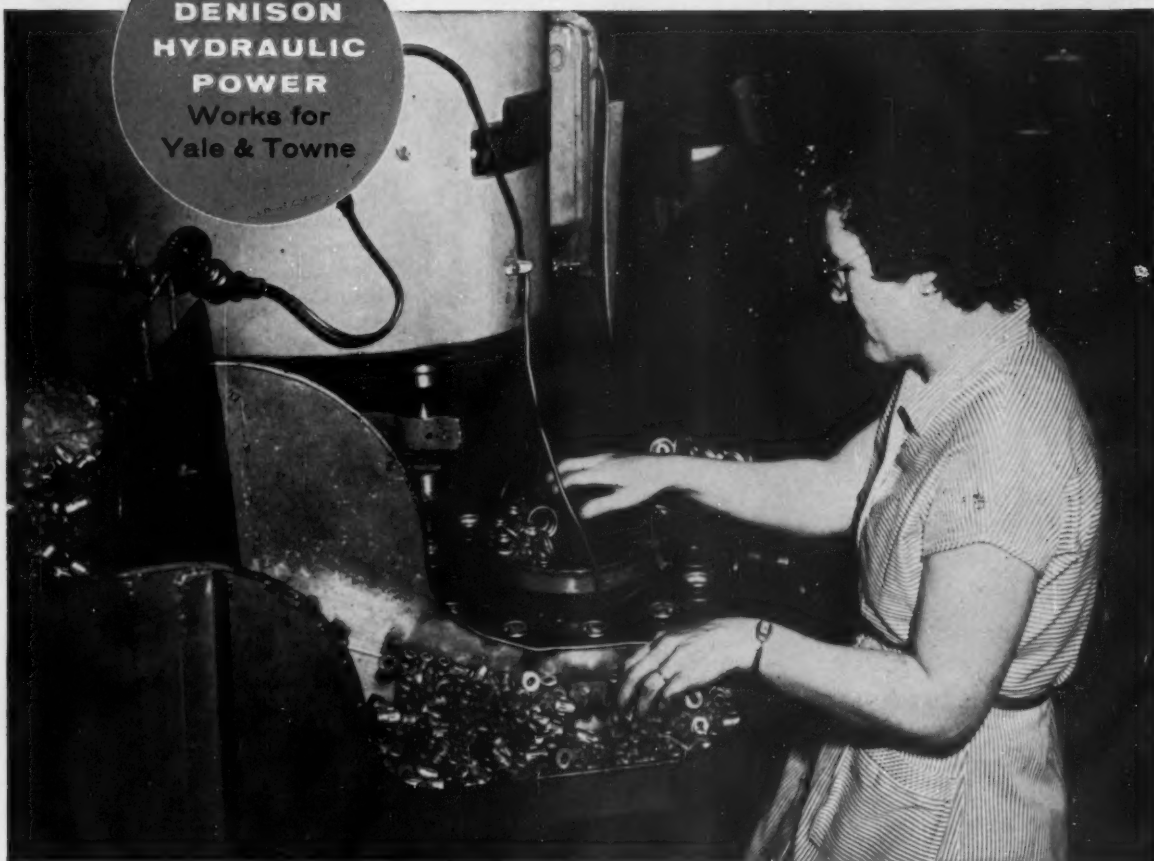
Kaiser Aluminum and Chemical Corp.; addition to new basic refractories plant, Columbiana, O., to boost annual basic brick capacity to 48,000 tons.

For More Canadian Aluminum



NO RESTING for the construction equipment at Aluminium Ltd.'s Kitimat plant. After carving room for a major smelter and town out of wilderness, kept right on working toward goal of 330,000 tons capacity by 1960.

How
DENISON
HYDRAULIC
POWER
Works for
Yale & Towne



MULTIPRESS[®] precision-assembles hardware parts



8-ton Denison hydraulic Multipress equipped with indexing dial, used to stake shanks and inserts for door knobs.

Assembling hardware components at The Yale and Towne Manufacturing Company is handled with marked efficiency with Denison hydraulic Multipress.

For example, an 8-ton Multipress, equipped with an indexing dial, closes brass scalp on brass cylinder shell. Components are loaded manually at the front of the index table well away from the press ram. The table indexes automatically to position the work beneath the ram.

After closing, with a single swift press stroke, the assemblies index to an unloading station where they are ejected automatically by air to a conveyor belt.

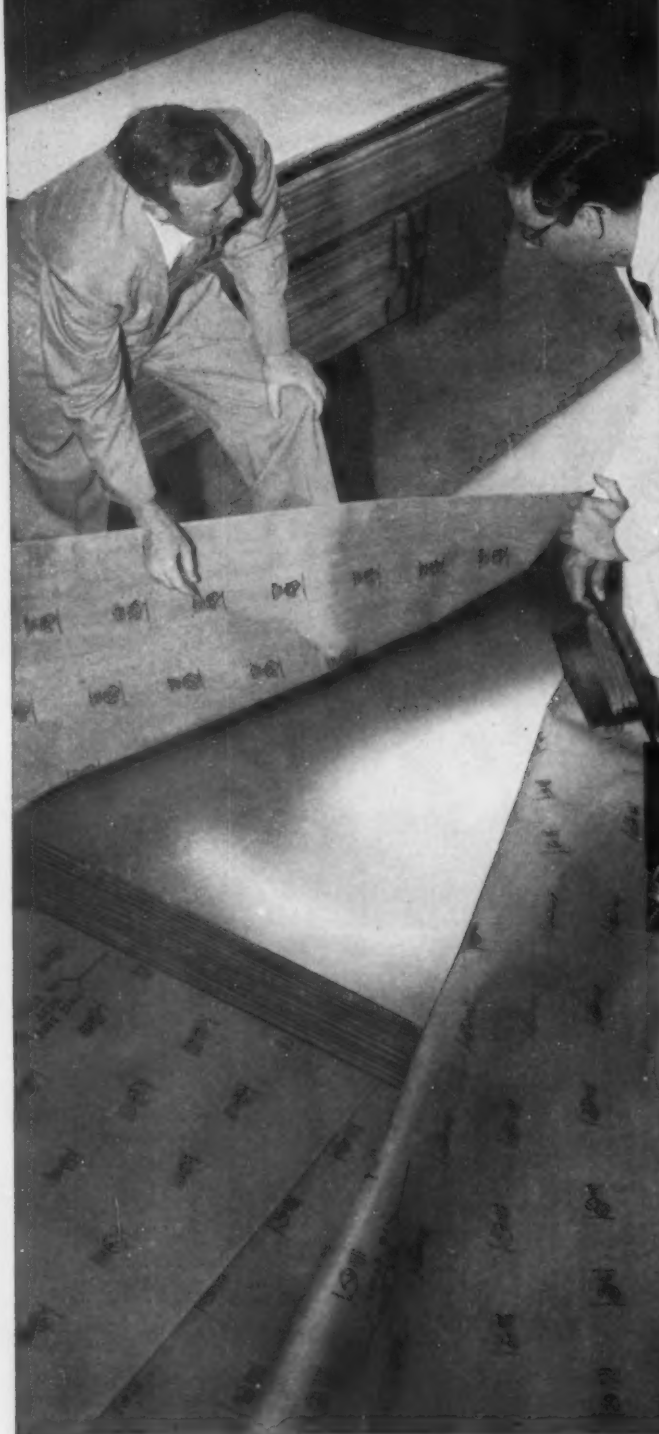
Yale and Towne also uses Multipress to assemble glass door knobs. Breakage has been virtually eliminated because of accurately controlled pressure of the Multipress ram.

Check into the Denison hydraulic Multipress to improve your production methods — cut your costs. A Denison engineer will gladly show you how. Write to Denison Engineering Division, American Brake Shoe Co., 1242 Dublin Road, Columbus 16, Ohio.

HYDRAULIC PRESSES • PUMPS • MOTORS • CONTROLS



how to rustproof steel in warehousing



When unusual times and conditions make it necessary for you to warehouse any kind of steel, even such sensitive steels as black plate and cold rolled, here's how you can combat the rust problem. Wrap your steel in Ferro-Pak, Cromwell's volatile corrosion inhibitor paper. Non-toxic chemical vapors from Ferro-Pak coat the steel with an invisible film that makes it impossible for rust to get the slightest foothold.

Even under adverse conditions, such as outside storing or shipping, Ferro-Pak provides complete protection. It is waterproof, strong, yet highly flexible and easy to handle. The chemical rust inhibitor is compatible with oil and stays effective for long periods even when the humidity soars.

Whether you're a shipper or a buyer of steel, it will pay you to specify Ferro-Pak wrapping wherever rust is a problem. For an interesting idea brochure on many uses for Ferro-Pak, write Cromwell Paper Company, 4803 South Whipple Street, Chicago 32, Illinois.



How to rustproof a freight car—Ferro-Pak is used to line sides of car and to interleave coils, transforming ordinary freight car into huge rustproof package.



How to rustproof black plate—On this light gauge, dry, uncoated steel, rust can start from a fingerprint. Ferro-Pak keeps black plate rust-free even when the humidity soars!

FERRO-PAK®

by Cromwell

For over 38 years—
"Paper Engineers" for Steel

REPORT TO MANAGEMENT

Have You Got The Judgment Jitters?

An important point to keep in mind in evaluating the market for steel and other basic materials is the general level of inventories.

There has been a tendency on the part of many businesses to live off their inventories. These had built up to substantial levels last summer and before. As always, the urge is to cut inventories, primarily to avoid the high cost of storing your own materials, but also to avoid being too far extended if business should slump.

This has been responsible for some of the slightly bearish talk that has been heard more frequently in recent weeks. A lot of businesses are staying out of the market for just that reason.

But the fact is that many of these inventory curtailers are getting apprehensive. In many cases, purchasing agents are downright alarmed, but have their hands tied from above where the rule is to get out from under that heavy inventory.

You Can Be Too Cautious

Realistic purchasers are eyeing their own dwindling inventories against the fact of volumes of unfilled orders that continue to climb. They are beginning to feel they have delayed too long, are developing "judgment jitters."

Don't be misled by automotive ordering. Steel people, for example, point to the fact that cold-rolled sheets aren't tight, in spite of the start of the new model production.

Furthermore, auto leaders aren't overly optimistic in their predictions for 1957. They are talking about 6½ million cars, which isn't earthshaking compared to 1955.

There's some evidence that the auto industry, which let itself get carried away this past model year, doesn't want to go out on a limb too far and risk being wrong two years in a row.

But the real evidence indicates Detroit will play it close to the vest in the fourth quarter. When auto orders come in for the first quarter of 1957, it may be too late to make up for lack of judgment now. Remember, automotive picks up more than 20 pct of all steel, 50-60 pct of all flat-rolled.

Footnote on the farm market: True, it's all been bad in the farm implement business. You know all about all the cutbacks, laying off and other symptoms.

The consolation is that the worst is now over. With the election soon out of the way, farmers can quit their political boycott. Farm income is up, and the soil bank is starting to take effect. This could bring the farm implement people back into the market before too long.

More on Tight Money

Amid the tumult and shouting about the Federal Reserve Board's tight money policy, there's one word to keep in mind—timing.

Timing is a most important factor in monetary policies. It is firmly understood by Chairman Martin of the FED and George Humphrey, Secretary of the Treasury.

Both Mr. Martin and Sec. Humphrey are equally determined to avoid inflation. Some slight additional tightening may be ahead.

But the money screws will not be turned too tight to the point where business is hurt. And they will be loosened before it's too late, if it looks like the economy could be injured by too much hard money.

INDUSTRIAL BRIEFS

Foiled Again . . . Revere Copper and Brass Inc. has purchased the Aluminum Foil Container Dept. of Wilkinson Mfg. Co., Omaha, Neb. The acquisition will continue to be operated for Revere by the management of Wilkinson and will be known as the Revere Aluminum Foil Container Division.

Lot of Heats . . . This year's production of steel includes the three billionth ton made in the United States since the "Age of Steel" began to take shape about a century ago, according to the American Iron and Steel Institute. Over 122 million tons of steel were made in 12 consecutive months for the year ending June 30, 1956.

Boom in Benelux . . . The Black & Decker Manufacturing Co., Towson, Md., has opened a new warehousing, service, and sales subsidiary in Brussels, Belgium. The new company, Black & Decker (Belgium) S. A., will distribute the line of portable electric tools throughout the Belgium-Luxembourg area.

Plastic Purchase . . . The American Can Co. has purchased the Bradley Container Corp. of Maynard, Mass., manufacturer of extruded plastic tubes and bottles. Formerly a subsidiary of Olin Mathieson Chemical Corp., it will operate as a wholly-owned subsidiary under the Bradley name. No changes are contemplated in personnel policies and operations.

Status Quo . . . Thomas Hydraulic Speed Controls, Inc., Wichita, Kan., has purchased the Aircraft and Automotive Products, Inc. The firms will operate as separate entities with no change in company name, each maintaining and adding to its present lines of products.

Chemical Reaction . . . Hooker Electrochemical Co. and Oldbury Electro-Chemical Co., Niagara Falls, N. Y., have approved agreement for consolidation of the two companies subject to approval by the stockholders of each company. Under the proposed consolidation, Hooker will be the continuing company and will be effected by the issuance of 45 shares of common stock of Hooker for each of the presently outstanding 10,000 shares of common stock of Oldbury.

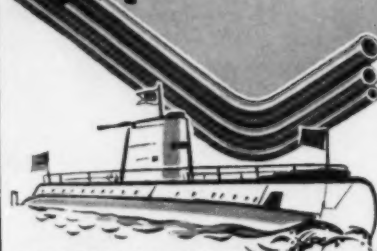
Waste Not, Want Not . . . In order to develop a broader market for by-products from its metallurgical operations, Electro Metallurgical Co. has set up a By-Products Div. within its Sales Dept. which will be responsible for the sale of by-products resulting from the production of ferro-alloys, metals, and calcium carbide. Headquarters will be in Niagara Falls, N. Y.

Product Probing . . . General Electric's Medium Induction Motor Dept., Schenectady, N. Y., will invest \$1.5 million in a development laboratory for the creation of new products and improvement in present lines. Facilities for motor research will include an engineering laboratory, advance engineering test area, and a development shop.

Atom Goes to Work . . . Westinghouse Electric Corp. has been awarded contract to develop nuclear reactor for the Yankee Atomic Electric Co.'s new atomic electric power generating station. Unit, which will produce 134,000 kw using a pressurized water reactor, will be built near Rowe, Mass. Scheduled for completion and initial operation in 1960, it will cost \$35 million.

**TMI STAINLESS STEEL
TUBING HAS**

*Atomic
Experience!*



**NEARLY 10 MILES OF TMI
TUBING IS PROVING ITS
WORTH ON THE NAUTILUS!**



**TMI TUBING IS ALREADY
UNDER ACTIVE TEST FOR
APPLICATIONS IN THE AIR!**



**TMI TUBING IS BASIC
IN AMERICA'S FIRST
COMMERCIAL NUCLEAR
ENERGY ELECTRIC
POWER PLANT!**



• TMI's Atomic Experience is at your service from the initial plans to the final proven specifications. Specializing in stainless steel and special alloy tubing—in small diameters, .050" to .625" O.D. with tolerances as close as .001" when required.

TUBE METHODS INC.

METALLURGISTS • ENGINEERS • MANUFACTURERS

BRIDGEPORT (Montgomery County), PA.

How Rollpin cuts assembly costs

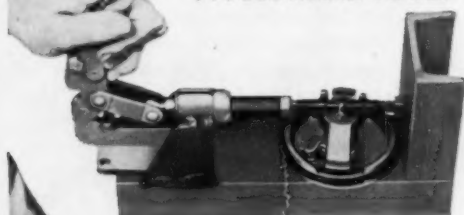
by matching the insertion method to the assembly problem



HAMMER IT IN . . .



. . . USE HAND TOOLS



. . . POWER TOOLS

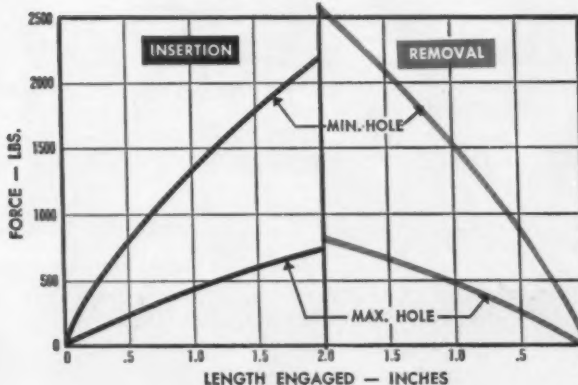
. . . OR AUTOMATIC EQUIPMENT



It's as easy to insert a Rollpin® as it looks. And it's fast any way you do it. You can use a hammer, hand tool, power tool or automatic equipment. Insertion cost is less because no precision drilling or reaming or secondary locking operations are required. A hole drilled to normal production standards will do.

Rollpin is a slotted, chamfered, cylindrical spring pin. It locks securely in place—and can be drifted out and reused over and over again. Rollpin replaces taper pins, straight pins and set screws; for many applications it will serve as a rivet, dowel, hinge pin, cotter pin or stop pin.

TYPICAL INSERTION AND REMOVAL FORCES IN STEEL FOR .250" DIAMETER ROLLPIN



WHY ROLLPIN IS SELF-LOCKING. Here is graphic evidence of the forces that make Rollpin a truly self-locking spring type fastener that will remain tight under vibration until deliberately removed.

ELASTIC STOP NUT CORPORATION OF AMERICA

Dept. R45-1077, 2330 Vauxhall Road, Union, New Jersey

Please send me the following:

- ☐ Rollpin installation data ☐ Here is a drawing of our fastening problem. What insertion method would you suggest?

Name _____ Title _____

Firm _____

Street _____

City _____ Zone _____ State _____



Are Days Numbered For Piston Engines?

Relative merits of conventional, free piston and gas turbine engines are argued by Big Three at SAE meeting . . . Free piston type must lick weight problem . . . Turbines lack braking—By T. L. Carry.

♦ THE OLD ARGUMENT about automotive powerplants has popped up again in Detroit. Which is the best engine for the future—the gas turbine, the free piston or the present day reciprocating engine?

The pros and cons of the three engines were presented at a recent session of the Society of Automotive Engineers by representatives from Ford, Chrysler and General Motors.

George J. Heubner, Jr., Chrysler's executive engineer for research, pointed out the potential of the gas turbine. At the same time, Dr. Donald N. Frey, director

of Ford's scientific laboratory, put in a good word for the free piston and Darl F. Caris, head of GM's research on automotive engines, defended the present reciprocating powerplant.

Chrysler's Craftmanship . . . Mr. Huebner says that many of the problems connected with the gas turbine have already been solved and that others are close to solution. He cites some of these problems as the need for scarce metals, acceleration lag, lack of engine braking and reduction of cost.

Chrysler has developed a new

fabrication approach to turbine wheel blades. These blades are about the size of a thumb-nail and individual fabrication would be a time consuming and costly process. In Chrysler's case, a method has been devised whereby all the blades are cast in one operation and the time and money saved is considerable.

Dr. Frey cautions against extravagant claims that have been made for the free piston type of engine. But he also points out that it compares favorably with today's powerplants in throttle response, fuel economy and cost of manufacture. However, Dr. Frey admits



HERE'S THE LATEST from Detroit: Chevrolet's 1957 Bel Air, above, features a new GM transmission and new styling. Chevrolet will offer a series of five engines ranging from 140 to 283 hp. American Motors' Rambler, top right, will have a V-8 engine for the first time. This station wagon will have 190 hp. Hudson, right, also has a new AMC V-8. This 4-door sedan will put out 255 hp. Hudson's have been lowered two full inches.



Matched plating processes improve chromium finishing

♦ Outstanding chromium finish obtained by plants using three unique Unichrome processes

♦ Platers also benefit by undivided responsibility for trouble-free copper-nickel-chromium operations

Three integrated Unichrome plating processes have proved they not only save time and money *individually* . . . but even more so working *together*.

The Unichrome Copper deposit is so smooth, it reduces copper buffing time or helps eliminate it entirely. Containing no cyanides, the plating solution cuts costs of waste-disposal also. A receptive base for subsequent nickel plate, Unichrome Copper avoids the trouble arising when a plate goes "passive"

IMPROVED NICKEL

Deposits from Unichrome Bright Nickel, in turn, prove unusually receptive to chromium plate. They resist cracking, add excellent corrosion protection to the base metal. Production-wise, the cost-reducing plating solution displays remarkable stability and reduces amount of additions to the bath, and also control-problems.

MORE EFFICIENT CHROMIUM

With self-regulated Unichrome SRHS® Chromium, plating time is often cut more than half, production capacity of equipment goes up, intricate parts can be successfully plated, and users report finishes with better "color".

These are just some of the many Unichrome processes and materials which offer you opportunities to cut finishing costs . . . to turn out a better product through a better finish. We would welcome the chance to work with you.

UNICHROME is a trademark of Metal & Thermit Corp.



PLATING MATERIALS
ORGANIC COATINGS
TIN & TIN CHEMICALS
CERAMIC MATERIALS
RADIOGRAPHIC EQUIPMENT
WELDING SUPPLIES
METALS & ALLOYS
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COMPROMISE

You get demonstration of your work and complete job development record

Cone submits samples of your work

Cone makes recommendations

You send print to Cone

There is no adequate compromise with efficient production practices, if you are in business for a profit.

But you don't always know just how competitively efficient your equipment is. Case histories of what the other fellow is doing are sometimes garbled. At least the poor ones are not advertised. And conditions vary in all plants. Sometimes you have reason to be more concerned with what you don't want in new equipment than with what you do want. Cone believes too much is at stake for a machine to go into a line unequipped for the job, with either carbide or hss tools.

The Conomatic Carbide Development treats each job individually from standpoint of work, machine, tools, and operating personnel.

DATA FOR COMPARISON

Part.....Bushing	Length..... $\frac{3}{8}$ "
Machine..... $\frac{1}{8}$ " Conomatic	Hole Dia..... $\frac{1}{4}$ "
Tools.....100% Carbide Tipped	RPM.....825
Material.....8620	Time.....14.8 Secs.
Stock Size..... $\frac{1}{8}$ "	



Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC., WINDSOR, VT., U. S. A.

For
particulars
send for
"Four Steps With Cone"

Automotive Production

(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS
OCT. 13, 1956	77,014	21,993
OCT. 6, 1956	62,970	21,127
OCT. 15, 1955	105,528	25,250
OCT. 8, 1955	85,640	16,556

*Estimated. Source: *Ward's Reports*

that the biggest disadvantage of the free piston engine today is that its weight is in excess of 3 lb per hp which is considerably more than the weight to hp ratio of today's engines.

Caris' Showmanship . . . Mr. Caris almost stole the show at the meeting. He presented his paper in a humorous vein. It was based on the assumption that the reciprocating engine was just in the development stages today and that it was being talked of as the most efficient replacement for the gas turbine.

"Let's suppose," Mr. Caris says, "that the gas turbine and not the piston engine has been used in the automobile since its inception around the turn of the century. Great strides have been made in its development.

What would the "new" piston engine promise the motorist driving a gas turbine automobile?

Its size and weight compare favorably with the gas turbine and free piston engines. It has improved fuel economy at a 7 to 1 compression ratio. One of its most exciting features is its negligible acceleration lag. It can operate at lower temperatures and the basic materials for it could be cast iron, low alloy steel, aluminum or magnesium.

Thus, Mr. Caris gives the impression that regardless of what is being said and done about either the gas turbine or free piston engine, it will be a long time before the old piston engine is completely replaced, if it ever is.

And he's right. Years of experience and know-how with the present engine are going to be hard to replace. There are still improvements that can be made. Compression ratios will gradually increase as the petroleum companies de-

velop better gasolines. In addition, better breathing qualities will make it more economical and efficient.

New Car Unveilings

Three new cars were introduced to the public this week. American Motors Corp. is showing off its Hudson and Rambler and Chevrolet is displaying its 1957 models.

The Hudson has a new V-8 engine, designed and produced by AMC engineers, which produces 255 hp. Its wheelbase is 121¼ in. and its overall length 209¼ in. The car has been lowered a full 2 in. and all models will feature 14 in. wheels.

The 1957 Rambler features a V-8 engine for the first time. It develops 190 hp and has a compression ratio of 8 to 1.

One of Chevrolet's biggest talking points in 1957 will be a new transmission which the GM division developed.

Chevrolet calls it Turboglide. It consists of three turbines and only two sets of planetary gears. These are combined with a variable pitch stator and a conventional torque converter pump. It is one of the smoothest transmissions to

Automotive News

be introduced so far and it has infinitely variable characteristics.

The new transmission will be available as an option only on Chevrolet's 283 cu in. engine.

Pontiac Styling

Veteran observers are convinced that the 1957 Pontiac is the most improved car from a styling standpoint. They hastily add that Pontiac offered GM stylists the most room for improvement.

The car emphasizes the longer and lower look so evident in the 1957 models. Many of the styling features identified with Pontiac have been eliminated.

S. E. Knudsen, division general manager, admits that Pontiac had a rough year in 1956, when the company produced a little over 400,000 cars. He believes that the division will be able to sell at least 525,000 cars this coming year and believes that the public could buy 6,500,000 units all told.

THE BULL OF THE WOODS

By J. R. Williams



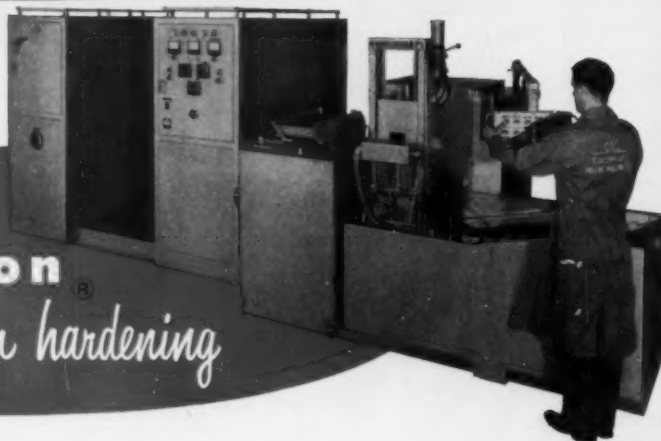
Here's selective heat treating
that can be
Made-To-Your-Measure!



flamatic
flame hardening



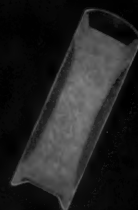
inductron
induction hardening



Cincinnati does both—selective flame or induction hardening—and the parts shown at right are typical of those that can be hardened by either method. If that's your situation, then talk to Cincinnati . . . headquarters for equipment that gives you the hardness wanted, where it's wanted, using the heat source most economical for you. Use electric power—or acetylene, propane, natural or manufactured gas—whichever is readily available to you or provides lowest cost.

Whether flame or induction, you can be assured of heat-treating machinery that will deliver the hardness you specify, and meet your cost-per-piece requirements, on high production quantities or varied, small-lot runs. It will be excellently engineered, equipped with the finest of components, thoroughly safeguarded, easily maintained.

Call in a Process Machinery Division field engineer. He is ideally equipped to evaluate your needs and give you unbiased recommendations as to the most economical equipment for your selective surface hardening work.



Transmission pinion pin



Locking pin



Bevel gear



Steering
arm ball
stud



Locking pawl



flamatic and inductron
hardening machines

THE PROCESS MACHINERY DIVISION
THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO, U. S. A.



How Long Will Tight Money Policy Last?

FRB insists there will be no early letup in money policy . . . But politics may enter picture if hard money appears to be costing votes as election approaches . . . Inflation still big concern—By G. H. Baker.

♦ **QUITE A FEW** Democrats passing through Washington while on campaign tours will tell you that the Eisenhower Administration's "tight money" policy soon will be eased. It's all a matter of practical politics, they insist, and the White House is planning to "throw the voters a bone" in the form of relaxed interest and mortgage rates very soon.

Well, at the Federal Reserve Board they insist this is all hogwash. Board members declare with some vehemence that they have not the slightest intention of letting money get any cheaper during the current quarter and probably not in the first quarter of 1957 either.

Inflationary Threat . . . Inflationary trends are still very strong, as the Reserve Board sees it. To increase the supply of money at this time, so the official Board reasoning runs, would be like adding gasoline to the already-smouldering fires of inflation.

Says one high official:

"We can have price inflation, on one hand, without any real gain in output; or, by postponing a few of the things we are trying to do all at once, we can keep a steady, upward trend without inflation."

You can take your pick.

The Reserve Board's "firm stand" could melt quickly if the White House really felt that "hard money" was costing a lot of votes. But the current outlook is for an extension of the existing money rates right through the winter.

Labor Takes Aim

"The AFL-CIO is doing a really effective grass-roots job in campaigning for the election of Democrats." This statement is made by a harried Republican House member who, like plenty of other Republicans in the House, is fighting for his political life in the current campaign.

"Ike looks like a safe winner for re-election," the candidate continues, "but the Republican Party is in real trouble in the congressional contests."

"The biggest thorn in our side is COPE (the political action arm of the AFL-CIO). COPE is working night and day at the door-bell

and grass-roots level for congressional candidates, nearly all of whom are Democrats."

But Senator Duff, R., Pa., says the labor leaders are talking nonsense when they try to convince working men that they're in a period of "hard times."

"How can you preach hard times to a man who is making more money today than he ever earned, who finds it going further because inflation has been halted, and who has a better standard of living today than he ever had?" Duff points out.

Coal for Export

Government coal experts foresee a continued gain in U. S. coal production for at least the next several years. Coal, for years a "sick" industry, is finally making a comeback, chiefly because of strong export demand.

Walter Tuohy, president, Chesapeake & Ohio Railway, says soft coal exports are going to double within the next few years. C & O is planning a huge expansion program for its Newport News (Va.) yards in order to speed up the movement of coal cars to the shipping docks for unloading.

The recent shipping combine organized by three railroads, seven coal companies, and the United Mine Workers for purposes of operating a fleet of 30 Liberty ships to carry coal to Europe is hailed as "only the beginning" in some coal circles. It's pointed out that Europe's current industrial prosperity shows no signs of slackening in the near future.



"What do I do here Mac? They just hired me, but all we talked about was wages, hours, overtime, bonuses, vacations and pensions!"

FAMOUS FIRSTS IN THE IRON & STEEL INDUSTRY

SAMUEL HIGLEY—AMERICA'S FIRST STEEL MAKER



The credit of producing the first steel in America goes to Samuel Higley, of Simsbury, Connecticut. In the Connecticut State Library there is a certificate signed by two blacksmiths . . . Phelps and Drake, stating that Higley took specially shaped wrought iron from them and later returned with the iron refined into steel. This certificate is dated May 7, 1728, but it has been established that Higley's first experiments bore fruit in or around 1725. Based on the testimony on this certificate Higley and his associate Dewey were awarded patent rights to run for ten years.

It is believed Higley made his steel by the cementation process. In this process charcoal was packed around wrought iron bars and the whole mass was

heated in a closed furnace for a week or more. The longer the iron was heated, the more carbon it absorbed from the charcoal. This "blister-steel", or rather an iron core with a steel surface, was poor in quality by modern standards, but it was the beginning of one of America's greatest industries.

The J. E. Baker Company discovered years ago how to prepare better dolomite. The results of constant experimentation developed BAKER'S MAGDOLITE, the original dead-burned dolomite. Today BAKER'S MAGDOLITE delivers more uniform ingots with less defective production material. Try BAKER'S MAGDOLITE today. It is always 5 ways better: Composition, Preparation, Strength, Economy, Quality.

3-55

ANOTHER FAMOUS FIRST



BAKER'S MAGDOLITE

The original dead-burned dolomite

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There'll Be Changes in Aircraft's Methods

Metal industry will have star role in building of tomorrow's planes . . . They'll need more high strength steel and titanium . . . Using harder alloys will require higher cutting, grinding speed—By R. R. Kay.

♦ **AIRCRAFT** production is undergoing an industrial revolution. Good tip to the 50,000 subcontractors and suppliers across the country: Get ready for it right now! Tomorrow's planes will need new materials, processes, and equipment.

Steel Will Star . . . Prediction: Some fighter airframes will be 40 pct to 80 pct steel and titanium within three years. Military planes now on the drawing boards will fly so fast that outer skin temperatures from 300°F to 1100°F will be generated. Aluminum alloys can't be used at even the lower end of this range.

Designers insist on more use of high strength steel and titanium alloys. They'll choose, too, from new families of non-metallic materials: glass, fused quartz, ceramics; and from high temperature plastics: phenolics, epoxies, silicones.

There will be a big jump in use of bonded, brazed, and welded structures, much of them in sandwich construction.

Machining's Importance . . . Machine tools for the harder alloys will need greater power and rigidity. Cutting speeds will be upped from present rates. Grinding equipment, too, is in for big hikes in speed to work titanium alloys.

All this will affect current manufacturing personnel, facilities, equipment, techniques, and tooling.

Every phase of aircraft manu-

facture will step up emphasis on technical know-how. It won't make sense for non-technical workers to supervise critical operations. That's how George W. Papen, manager of Lockheed Aircraft's Production Engineering Dept., sees it. And that's what he told some of the nation's top aircraft people at the Society of Automotive Engineers' National Aeronautic Meeting in Los Angeles.

Aircraft Soars High

Latest results in the Boeing vs Douglas race for jet-liner business: Boeing now leads Douglas with contracts for 134 of its 707's. Douglas has orders for 114 DC-8's.

More are on the way for both companies.

And there's no end to the military business coming to West Coast aircraft plants. Here are the latest whoppers: \$166 million to Lockheed Aircraft for more supersonic F-104 Starfighters (see cut) plus another \$100 million order for C-130's, Hercules transports.

North American Aviation got over \$70 million, mostly for XSM-64 guided missile research and development. And \$2.2 million went for research on new titanium alloys for supersonic aircraft and missiles. Hughes Aircraft landed a \$5.4 million contract for fighter missile systems.

More Aerial Insurance for Uncle Sam



♦ **THESE SPEARSHAPED XF-104 Starfighters** will pioneer a series of fast U. S. Air Force jets to be produced by Lockheed factories as a result of newly-placed orders worth \$166 million. Contracts include a \$115 million order for F-104As as well as \$51 million worth of F-104B two-seat versions. A photo-reconnaissance model has also been authorized.

Starfighter's over-all length is just above 54 ft and wingspread is 7½ ft from fuselage to wingtip. Its horizontal stabilizer is placed high on the fin and moves as single unit to aid in giving precision control at high speeds. Air Force states the Starfighter "brings us to speeds and altitudes never before encountered in operational aircraft."

what's going on at **MARVEL**?

1. A NEW BUILDING PROGRAM...



Not long after you read this, we will have completed the MARVEL plant expansion program which will *double* our already considerable manufacturing space. MARVEL'S confidence in the future and its continuing development, coupled with the increasing demand for MARVEL Hack Saws, Band Saws and Hack Saw Blades, makes this expansion mandatory.

2. A NEW "SUPER" BAND SAW



In our enlarged plant, we will demonstrate for the first time, a completely new, heavy duty, all-hydraulic, fully universal MARVEL Band Saw designed especially for High Speed Steel Band Saw Blades. This new "Super" Band Saw is heavier, more powerful and rugged than any band saw yet available. It incorporates a great many new and exclusive design and operating features to make it the most advanced Band Saw for BOTH high production and universal work.

3. AN INVITATION TO "TRY" BEFORE YOU BUY



One or more of the new Band Saws will be set up in our new plant, together with new, improved MARVEL Hack Saws, to demonstrate comparative performance on a wide variety of work. We will also set up specific cutting-off jobs requested by customers or prospective purchasers on *both* types of machines and arrange to have interested personnel observe and check the demonstration of comparative saw performance *on their own work*.

What better way is there to prove to yourself the speed, accuracy, efficiency and economy of MARVEL Saws and to select the right type of saw (hack saw or band saw) to best fit your individual job requirements?

ARMSTRONG-BLUM MFG. CO.
5700 Bloomingdale Avenue • Chicago 39, Illinois

G-1600





Team Carbide-Ceramics for Better Machining

Combining both in same tooling setup can lick cutting problems over speed range of 0 to 2600 fpm . . . Carbides seen best at lower speeds, ceramics better above 1000 fpm . . . New tool test standard now ready—By E. J. Egan, Jr.

♦ **METAL CUTTING** problems over a speed range of 0 to 2600 fpm can be overcome by proper combination of carbides and cemented oxides in the same machining setup, provided that correct tool design is used.

GE's carbide engineers advocate this idea, put on demonstrations at the Metal Show in Cleveland last week to show that it works.

In getting carbide tools to work efficiently below 200 fpm, tool geometry is a big item. According to engineers, "cutting forces increase rapidly below 200 fpm on both positive 6° and negative 5° side rake tools, but these drop down as speed is reduced below 100 fpm on 5° negative rake tools."

Failure Factor . . . If you're reaching for cutting speeds above 1000 fpm, ceramics seem to be the answer. They don't tend to fail at the cutting edge as the carbide tools do. But it's well to remember that in their speed province, the ceramic tools are not as tough as carbides are in the area they've staked out.

If you want to do some tool testing of your own, you'll be interested in a new standard for making life tests on single point carbide tools. It was about 10 years in the making, has just been approved and designated by American Standards Assn. as ASA No. B5.34—1956. Single copies are available at \$1 each from ASME, 29 W. 39th St., New York 18, N. Y.

Flanks Are Clue . . . New standard is based on the fact that

although carbide tools generally exhibit both flank wear and cratering, basing tool life on flank wear alone seems to give satisfactory results. Moreover, this is true whether tools of different grades or machinable materials of different types are being compared.

Value of 0.030 in. of flank wear (measured from the original cutting edge) was selected as a basis for making tool life comparisons. This degree of wear is considered representative of average commercial practice.

Appreciating Depreciation . . . Are you still taking a straight-line tax depreciation for new machine tools or other depreciable assets bought since January 1, 1954? If you are, you're not getting the maximum after-tax rate of return you're entitled to.

Machinery & Allied Products Institute says you're missing the boat if you don't switch to one of the new depreciation methods sanctioned by the 1954 Internal Revenue Code. Reason: a simple bookkeeping shift to either the sum-of-digits or double-declining-balance techniques will boost your after-tax return rate by 10 to 15 pct.

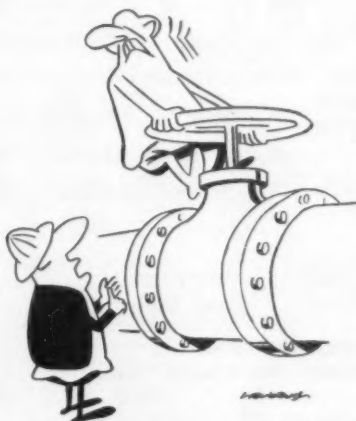
What's more, MAPI says you'll edge closer to the 15 pct side of the range if you borrow part of the money to buy new equipment.

Get Those Extras . . . Making the changeover to one of the new depreciation methods costs so very little in time and effort that it's almost like finding money when you get those extra benefits after taxes. And there's no doubt that you're legally and ethically entitled to them. In fact, MAPI says it's good for the nation's economy, too.

Which of the new methods should you use? According to the Institute: "The double-declining-balance method with straight-line switch is more favorable than sum-of-digits for very short service lives, but is somewhat less favorable for others."

Details of these recommendations and proof to support them is offered in booklet, "Effect of the New Tax Depreciation Methods on the Earnings of Depreciable Assets." You can get single copies for \$1.00 and quantity prices on request to: Machinery & Allied Products Institute, 1200 18th St., N. W., Washington 6, D. C.

THE IRON AGE



"Whenever I can't open something at home I hold it under the hot water!"



Power TO MOVE A WORLD!

➔ America stands on the threshold of a golden age. The sinews of her dynamic economy are flexed as never before. Increased power for untold requirements will be needed . . . and *met* by the most dependable supply of low-cost energy—*Bituminous coal!*

Proven usable reserves in B&O territory contain billions of tons—*available for centuries to come.*

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BITUMINOUS
COALS FOR
EVERY
PURPOSE





The Iron Age

SALUTES

Jack Trantin, Jr. President of Youngstown Alloy Castings Corp. and Waunakee Castings Corp., he applied the "do-it-yourself" urge to heavy industry and got unusual results. A shortage of skilled labor posed no big problem for him.

One way of getting a start in the steel business is by building an openhearth furnace in your back yard.

That's the way Jack Trantin, Jr., president of Youngstown Alloy Castings Corp. and Waunakee Castings Corp., did it back in 1932. Under a gnarled old peach tree, he pieced together his "world's smallest openhearth" from discarded parts. He operated it in all kinds of weather. And frequently, aluminum potware borrowed from Mrs. Trantin's kitchen went into the melt.

In due time, Jack Trantin was producing special formula castings—doing highly controlled jobs that most foundries were unwilling to tackle.

His first order was for casting guide shoes for seamless tubing mills. Next he developed a chromium steel plug used in rolling mills that could out-roll cast iron plugs 9,000 to 16. Then

came high alloy steel guides which multiplied shape rolling production.

Two years later, Mr. Trantin organized the Youngstown firm, which now produces 19 special alloy castings for steel mills. In 1953, he established a foundry at Waunakee, Wis., for making agricultural implements. He personally trained farmers and their sons for jobs in his plant, emphasizing teamwork and pride of workmanship.

His own start in metalworking dates back to his high school days during the early 1900's, when his dad taught him the toolmaking and machinist trades. After graduating from the University of Wisconsin with a degree in chemical engineering, he worked as a metallurgist, research engineer and foundry superintendent.

By the time he got around to entering the business via his own back yard, Jack Trantin had mastered most of steelmaking's fine points.



SCRAMBLE! Thanks to the Distant Early Warning radar line, defending planes may have 4 to 6 hours' warning before a 600-miles-per-hour enemy jet bomber could hit United States key industrial cities.

Copper stands guard in the "DEW"

Hostile aircraft coming in to attack from above the Arctic Circle will get a hot reception.

"Hot lines" from radar installations to Air Defense Command Centers will flash the presence of an enemy . . . touch off a fast and furious counter-attack.

For *copper* serves throughout the 3,000 miles of the Distant Early Warning System, (the DEW line.)

Copper makes possible the radar that detects the enemy, the computers that track his flight. Copper is the inner conductor of signal-carrying coaxial cables, the inner core of cables supplying

power. Printed circuits, contact springs, bushings, clamps, coils and a thousand other "parts" . . . plus wire by the thousands of miles . . . *all copper or alloys of copper!*

Where electrical conductivity must not falter, where corrosion-resistance must not fail, even in blizzard or permafrost . . . *only copper will do!*

And where, as in the logistics of DEW line construction, *miniaturization* is the only answer, *copper is indispensable.*

In the Nation's defense or her industry's advance, copper is essential to products that are essential to progress.

COPPER & BRASS

RESEARCH ASSOCIATION

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COPPER OR ITS ALLOYS PROVIDE THESE ADVANTAGES: Best conductor of electricity commercially available • Does not rust . . . high corrosion resistance • Best heat transfer agent of all commercial metals • Easy to machine, form, draw, stamp, polish, plate, etc. • Welds readily . . . excellent for soldering and brazing

The Iron Age INTRODUCES

G. W. Kelch, elected president, Ingersoll-Humphries Div., **Borg-Warner Corp.** Mansfield, O.

Wallace B. Bainton, elected vice president and general manager, machine tools, **Brown & Sharpe Manufacturing Co.**; **Wallace E. Anderson**, elected vice president and general manager, industrial products.

Dr. Paul J. Flory, named executive director, research, **Mellon Institute**, Pittsburgh.

Ernest G. Unrath, elected vice president, manufacturing, **The National Supply Co.**, Ambridge, Pa.; **F. W. Bremmer**, elected vice president, engineering; **Joseph R. Mahan**, named director, research and engineering.

Walter J. Kalmeyer, elected vice president, **Standard Steel Corp.**, Los Angeles; **Clay C. Hopper**, appointed assistant general manager; **Norman Pitt**, named chief engineer.

Frank A. Mitchell, named general sales manager, **Henry Disston Div., H. K. Porter Co., Inc.**, Philadelphia.

Jordan D. Raileanu, named assistant plant manager, **The Solar Steel Corp.**, Worcester, Mass.

E. Hall Jones, named assistant manager, shipping, **Republic Steel Corp.**, Cleveland.

Llewellyn F. Hutchinson, elected vice president, operations, **Precision Drawn Steel Co.**, Camden, N. J.

L. S. Larson, elected controller, **The Standard Products Co.**, Cleveland.

Elmer D. Robinson, appointed director, manufacturing, **Morse Chain Co.**, Ithaca, N. Y.

Dr. Sidney Krasik, named manager, Physics and Mathematics Dept., Bettis Plant, **Westinghouse Electric Corp.**, Pittsburgh.

A. Trail, named manager, Rochester, N. Y. district sales office, **Vickers Inc.**, Detroit; **Thomas J. Liddell**, named application engineer.

Dr. Harold J. Dawe, appointed technical staff consultant, **Acheson Industries, Inc.**, Port Huron, Mich.

E. J. Reitler, named assistant sales manager, **Firth-Loach Metals, Inc.**, McKeesport, Pa.

William C. Greenleaf, named manager, metals development, **U. S. Industrial Chemicals Co.**, Div. of National Distillers Products Corp., New York.

Albert J. Hanssen, appointed chief engineer, **Conoflow Corp.**, Philadelphia.

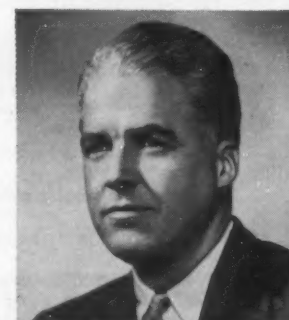
PERSONNEL



WILLIAM R. BASCOM, elected vice president, **Granite City Steel Co.**, Granite City, Ill.



DR. I. A. OEHLER, elected vice president, operations, **The American Welding and Manufacturing Co.**, Warren and Niles, O.



RICHARD D. JENKINSON, JR., named manager, Pittsburgh district sales office, **Pittsburgh Steel Co.**



JOSEPH L. CONNELL, named manager, Warren District sales office, **Pittsburgh Steel Co.**

FORGING, COINING and MILLING *Eliminated!*



INVESTMENT CASTING Proves the Point

PART: Paper Gripper for Printing Press

MATERIAL: Alloy Steel 4340

PROBLEM: To lower costs substantially below those of difficult and expensive forming methods yet retain the following features:

1. Sharp reverse knurling for more efficient gripper action.
2. Maintain uniform gripping action from part to part.
3. Eliminate milling and coining operations.

SOLUTION: An EPCO Investment Casting - It produced a sharp gripping pad in true relationship to the center line of part.

CONCLUSION: When the shape of a part makes it difficult or expensive to perform special forming operations check an EPCO Investment Casting as a possible solution.

Send us drawings, samples and specification of parts for detailed process analysis and cost quotation without cost or obligation.

Representatives Wanted
in Baltimore, Philadelphia, Detroit and
Chicago areas.

ENGINEERED PRECISION CASTING CO.

Metawan, N. J.



I A 68

Following appointments are within the Engineering Dept. of Jones & Laughlin Steel Corp., Pittsburgh. D. H. Miller, named planning and development engineer; R. W. Barnitz, named chief electrical engineer; Stephen Vajda, appointed special engineer.

John E. Taylor, appointed field engineer, Cleveland district office, Norton Co., Worcester, Mass.

Dr. D. M. Young, appointed associate technical director, Union Carbide Development Co., Div. of Union Carbide and Carbon Corp., New York.

Matthew J. Donachie, appointed works manager, Prentiss Wire Mills, Holyoke, Mass., The Riverside Metal Co., Div. of H. K. Porter Co., Inc., Riverside, N. J.

Paul A. Dougher, named works manager, Verona Works, American Steel Foundries, Verona, Pa.

Dean H. Snelgrove, appointed industrial sales representative, Southwestern Michigan, J. B. Ford Div., Wyandotte Chemicals Corp., Battle Creek, Mich.

Harold E. Booth, appointed plant electrical engineer and superintendent, Electrical Dept., Copperweld Steel Co., Warren, O.

D. D. McKillop, elected vice president, operations, Coolidge Corp., Middletown, O.; John R. Garwood, elected secretary-treasurer.

James D. Barlow, appointed purchasing agent, Leece-Neville Co., Cleveland.

Julian A. Terpenning, named technical service engineer, Archer-Daniels-Midland Co., Lancaster, Pa.; Joseph Hekler, appointed sales representative, Foundry Products Div., Lansing, Mich.

George A. Kaufman, named assistant chief engineer, engineering and planning, Jones & Laughlin Steel Corp., Pittsburgh.

PERSONNEL



EDWARD C. PETERSON, elected vice president, Rolling Mill Equipment Div., Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.



ROBERT W. MULLIN, named asst. to general manager, sales, Pittsburgh Steel Co.



RUDOLPH F. SCHLENTNER, named manager, sheet sales, Pittsburgh Steel Co.



MILTON C. MORRISON, named manager, roll-formed shapes, Industrial Parts Div., Reynolds Metal Co., Louisville.



High Frequency Furnaces. Norton MAGNORITE cement is engineered to provide maximum heats per lining. It gives extra long service life at temperatures to 3250°F, its high-rammed density resists metal penetration, erosion and chemical attack, and it is free from shrinkage cracks.



Low Frequency Furnaces. Foundries melting nonferrous metals and malleable iron report longer life from linings of Norton ALUNDUM cement. This high-melting, long-lasting cement is also prescribed for use in holding ladles and desulphurizing ladles.

ON TIME! ...with melt after melt

*Norton Refractory R's help maintain
hot metal schedules, reduce shut-downs,
in your furnaces*

Norton ALUNDUM*, CRYSTOLON*, MAGNORITE* and FUSED STABILIZED ZIRCONIA refractory materials are engineered for longer, lower cost service — and prescribed for better processing in many foundry applications.

For R's that will improve your own processing call in your Norton Refractories Engineer. Or write to NORTON COMPANY, Refractories Division, 209 New Bond Street, Worcester 6, Mass. In Canada: A. P. Green Fire Brick Co., Ltd., Toronto 5, Ontario.

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

NORTON

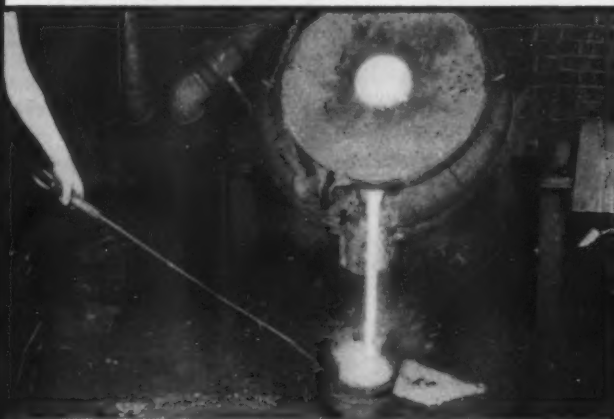
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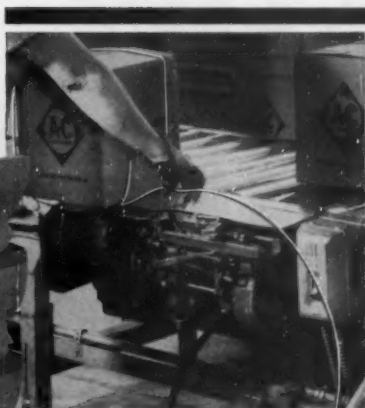


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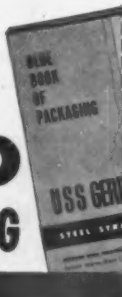
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Robert W. Snowden, appointed special assistant to the vice president in charge of purchases and traffic, **Heppenstall Co.**, Pittsburgh.

John P. Grilli, named special metallurgical products representative, **H. K. Ferguson Co.**, Cleveland.

H. D. Leisenring, appointed general sales manager, Meter Products Div., **A. O. Smith Corp.**, Los Angeles.

Warren McKittrick, elected vice president, **Sparks-Withington Co.**, Jackson, Mich.

Andrew Hunter, named New York district sales manager, **Aluminum Limited Sales, Inc.**, New York.

William W. Hamilton, Jr., appointed research engineer, Research and Development Dept., **Dravo Corp.**, Pittsburgh.

Jack H. Smith, appointed director, Copper Div., **Business Defense Services Administration**, Dept. of Commerce, Washington, D. C.

Harold C. Templeton, named chief metallurgist, **Alloy Steel Products Co., Inc.**

William Talbot, named director, research, **Kerr Manufacturing Co.**, Detroit.

W. Carlisle Huckabee, named sales engineer, Service Div., **The United States Testing Co.**, Hoboken, N. J.

Edward J. Cassidy, named manager, Defense Div., **Servel, Inc.**, Evansville, Ind.

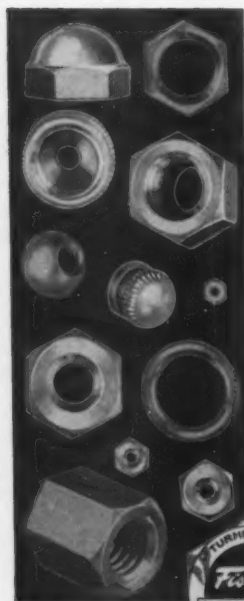
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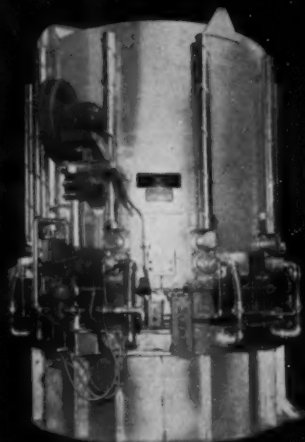
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The 650 ton double action press shown above incorporates all the advantages of Clearing enclosed design. Operator is shown using the new Clearing Flextrol—a device that lets the operator anchor his operating buttons at the exact spot for most convenient operation on each job.



Automation Limit Switch controls operation of auxiliary feeding devices.

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of piping common to the average press installation. Controls—even the master control cabinet, a bulky six foot box to find space for—are built right into the press uprights. And all wired neatly ready to go!

There are no lamp brackets or air connections to hang onto this press frame. Die space lighting is taken care of by two "walls of light" recessed in the uprights next to the dies. Press Air Manifold and Automation Air Manifold are pre-installed within the press frame.

Below are some of the details of Clearing enclosed press construction. Take a close look at them and if the advanced thinking in design shown here agrees with your conception of what a press ought to be, call on a Clearing sales engineer for more explicit data.



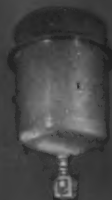
Safety blocks used when setting dies are chained to disconnect plugs which break all control circuits when pulled.



Enclosed die space lights flood die area with even, shadow-free lighting.



Terminal blocks are enclosed at the junction points of crown and uprights to simplify wiring at installation.



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Automation Air Manifold mounted in dust tight enclosure.



Master control panel is recessed into press upright.

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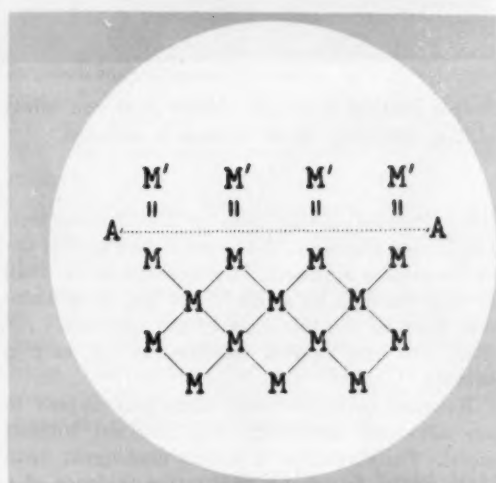
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Search for standards—



Plating Adhesion: Which Test Do You Buy?

By P. M. UNTERWEISER, Metallurgical Editor

♦ "Cheaper by the dozen" doesn't apply to tests for plating adhesion . . . On the contrary, as the number of available test methods pile up, the subject of adhesion seems to grow even more confusing.

♦ Some standards for adhesion are obviously essential . . . But which? . . . What progress is being made to help the millions of plating users measure and maintain the quality of their products? . . . Here are a few of the more important answers.

♦ ADHESION and electroplated coatings are about as interdependent as numbers and arithmetic. Without one, the other is rendered inoperative and useless.

But adhesion itself is a tricky variable. It can be good, bad, or just so-so. To be generally meaningful, it requires measurement. It is important to be able to distinguish "good" from "so-so" in terms of universally acceptable standards. Devoid of measurement, adhesion remains a rather hazy property subject to arbitrary interpretation.

From the business standpoint, adhesion and its many ramifications might be academic if it were not for one discomforting fact. The commercial acceptability of any plated article is unalterably dependent upon the adhesion of the plate. Unsatisfactory adhesion is *prima facie* cause for rejection; and rejections cost money.

In the metalworking industry particularly, annual losses due directly to poor adhesion run into the many millions of dollars. Just about everyone in the industry is obliged to pick up a part of this tab at one time or another.

Scientists are well aware of the problem. More than 50 years ago, they began to split adhesion into two essential parts—how to get it, and how to measure what you've got. But while the techniques for improving adhesion have consistently flourished, progress in measurement has tended to wither on its own busbar.

Of course, there are a few glimmers of light in this otherwise gloomy picture. As Dr. Abner Brenner of the National Bureau of Standards points out, some tangible progress has been made in the field of *specific* tests for adhesion. Specific tests are those whose validity may be restricted to a particular coating on a particular "basis"

metal* and, sometimes, even to a particular part.

Specific tests, as should be apparent from this definition, are loaded with "ifs." They are never generally applicable to all of the garden variety of plated coatings. Nor can they be tied down to all of the basis metals capable of being plated.

Dr. Brenner's estimate of the status of present-day tests is essentially accurate, though tempered with a certain amount of personal modesty. Much of his own work in *general* adhesion testing is fundamental in nature and might well lead to the development of commercially feasible tests in the future. But since his personal contributions to the field are of fairly recent vintage, it is significant—and occasionally amusing—to trace a few of the developments which have been handed down from the past.

Although not primarily interested in test procedures, Nobel Prize-winner Irving Langmuir attempted to clarify scientific thinking on molecular forces—the forces of cohesion.

"In the past," he wrote, "it has been customary to consider that solids and liquids are held together by the 'forces of cohesion' and are called 'physical forces' as distinguished from chemical forces . . . There is no present justification for this distinction . . . Cohesion, absorption, and surface tension are all manifestations of forces similar in nature to those acting between the atoms of solid bodies. It is . . . advantageous to look upon these forces as direct results of chemical affinity."

Bend tests lead parade

Dr. Langmuir's clarification—a highly significant step toward understanding adhesion—appeared in 1910. Although early in the game, it had already been preceded by at least a few attempts at actual physical testing.

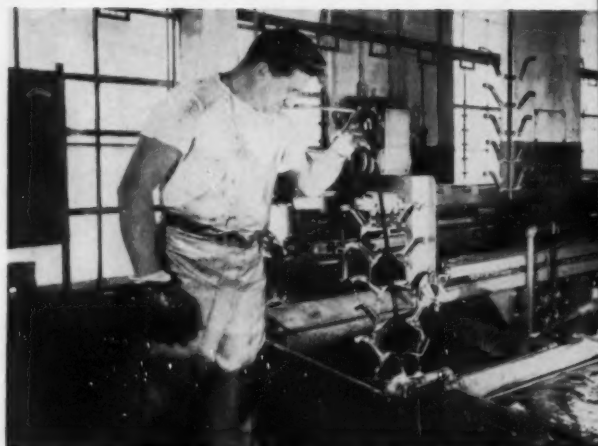
By the turn of the present century, zinc plating was well on its way toward commercial acceptance. So that, as might be expected, two of the first recorded tests for adhesion were concerned with the bond obtained between electrodeposited zinc and iron.

One of these trail-blazing tests involved passing the zinc-coated specimens between iron rolls. The pressure exerted by the rollers tended to accentuate both brittle and ductile conditions in the zinc layer. Following compression, samples were further tested by means of bending.

The second of these tests, destined to establish a record for longevity, was a straight bend test. Its objective: to determine the degree to which galvanized iron could be bent before nucleating cracks in the zinc coat.

Some inkling of the progress made in general adhesion testing can be gleaned from a comparison of this test (circa 1905) with one of the

"Basis" metal is the term scientists prefer to "base" metal, since the latter can be taken to mean any metal classed as non-precious.



Hanson-Van Winkle-Munroe Co.

Proper racking is another factor that can affect plating adhesion. Good contact is essential.

latest Federal specifications on the adhesion testing of zinc plating (1954). According to this up-to-the-minute approach, "the test specimens shall be bent through an angle of 180 deg. on a diameter equal to the thickness of the specimen . . ." Such are the limited refinements of half a century.

However primitive bend tests may appear to our advanced technology, they are not without merit. Their validity is largely contingent upon their ability to provide qualitative evidence of a true bond between coating and basis metal. Perfect adhesion is assumed when fracture results in the basis metal, parting both the coating and a portion of the basis metal from itself.

Such qualitative evidence can be assumed to show that the molecular bond between coating and basis metal actually exceeds the molecular bonding *within* the basis metal.

Closely allied to bend tests are a number of tests involving twisting. The first twist tests reported were proposed as a substitute for bend tests. Although some *specific* twist tests have proven useful, most experts believe their general applicability is even more limited than that of bend testing.

Twisting falls short

In the opinion of Dr. H. K. Work, "the only way in which the twisting test could be made valuable quantitatively would be to prepare a test on a given coating for every temper of every alloy that is commercially used. This is impracticable, considering the number of alloys that are now on the market. Neither does this procedure apply to castings. Even if these careful tests were made, they would be useless in measuring true adhesion unless the physical properties of the plate were kept constant."

But regardless of the present status of bend and twist tests, it is obvious that many scientists

were never quite satisfied with them. Presumably, their dissatisfaction accounts for the multitude of other adhesion tests devised as preferable substitutes.

A few of these tests are ingenious and may, in time, offer clues to a more basic approach. Others seem to reflect a "trial and error" method of research where success, if achieved at all, is reached by laborious process of elimination.

Not all of these tests lend themselves to generalized classification. Some tend to overlap or incorporate portions of other techniques. Among the tests which have been given serious consideration in recent years are: 1) burnishing, buffing, and abrasion, 2) impact or hammering, 3) heating, 4) black light or fluorescent, 5) Erichsen cup and variants, 6) scratch, 7) chisel, 8) sawing, 9) cathodic treatment, 10) Mesle "can opener," 11) Jacquet, 12) Burgess, 13) Ollard, 14) ring and plug, 15) Roehl modification, and 16) micro-adhesion modification of Ollard method.

All in all, even this incomplete list presents an array that would require volumes to describe in detail.

Many of these tests are destructive in nature: at least one sample must be destroyed to perform the test. Some are euphemistically referred to as "semi-destructive," although this description is often of doubtful accuracy. Wholly non-destructive adhesion tests are rare.

Everything's being tried

With the exception of bend tests called for in many specifications, few of the other tests mentioned even approach widespread acceptance. According to an A.E.S. report, burnishing tests are limited almost exclusively to silver and gold plating. Impact tests are similarly restricted to certain coatings.

Most heating tests have been treated with skepticism by the experts. Black light and fluorescent testing are judged to be of "questionable value." Erichsen cup tests have been given a rather cold reception. A few of the tests which may be acceptable to the experts—the Ollard and Jacquet tests, for example—seem to fall short of commercial acceptance.

As Dr. Brenner has emphasized, "the most difficult task in developing a method for testing adhesion is to find a means of gripping a thin coating in order to apply to it a pull sufficient to detach it from the basis metal." His nodule method of measuring adhesion, in his own opinion, "still leaves something to be desired, but it overcomes most of the difficulties associated with other test methods."

The Brenner nodule test requires electro-forming a mushroom-shaped knob on the plated surface to be tested. This nodule, in turn, provides a means for gripping in a special chuck, so that a tensile-type test can be performed. Measure-



Hanson-Van Winkle-Munning Co.

Meticulous cleaning is required if a good bond is to be obtained between plate and basis metal.

ments are quantitative and are recorded in psi. Complete details of the method were presented before the A.E.S. in 1950.

Principal disadvantage of the nodule method is that the test must be conducted in a laboratory by a skilled technician. It is also time-consuming. Estimates indicate that a single technician can prepare and test no more than about 10 specimens in a normal working day.

Advantages stem from the fact that no specially shaped test pieces are required. Machining operations are eliminated, and physical test equipment is kept simple. Results are quantitative rather than qualitative.

Looking to the future, there is an obvious need for additional research in the field of adhesion testing. Most desperately required are tests that lend themselves to mass production techniques while still retaining a high degree of accuracy.

Pending future developments, most current problems will have to be met with the few general, and the many specific, tests now available. Much of the accumulated experience pertaining to these tests is referenced by the National Bureau of Standards.

ACKNOWLEDGMENT

The editors would like to acknowledge the assistance gained from various A.E.S. reports in developing background material for this article. Interviews with Dr. Abner Brenner and Mr. F. Ogburn of the National Bureau of Standards are also gratefully acknowledged.

Reprints of this article are available as long as the supply lasts. You may obtain a copy from Reader Service Dept., THE IRON AGE, Chestnut & 56th Sts., Philadelphia 39, Pa.



Whirling steel—

New Oxygen Steelmaking Process

Cuts Cost; Boosts Quality

◆ Now in commercial operation in Sweden . . . a new rotary oxygen steelmaking process christened Kal-Do . . . Out of the lab and into regular production since May 1956 . . . Described exclusively by The Iron Age.

◆ Product of Stora Kopparberg, giant Swedish firm of steel, paper, power, chemicals and concentrates, the process will get close scrutiny from American steelmakers.

◆ Major advantages claimed . . . clean quality steel at lower cost, controlling carbon without need for recarburization, economic use of iron ore as cooling agent.

◆ OLD IN TRADITION and modern in outlook, Sweden's Stora Kopparberg Corp. has come up with a new oxygen steelmaking process. This evolutionary method is a commercial success. Its potential will be investigated closely by the American steel industry in view of widespread interest in oxygen steelmaking here.

Stora's Kal-Do rotary oxygen steelmaking process is brand new in the commercial sense. The rotating 30-ton converter began production in May 1956. Since then it has been in regular operation. More than 350 heats of steel have been made.

First experiments leading to the present



STANDING before rotary oxygen furnace are Prof. Bo Kalling, process' inventor, (l.) his assistant, Folke Johansson (r.) and (center) Tom Campbell.

rotary oxygen converter were carried out in a 3-ton furnace in 1948. The idea of a rapidly rotating furnace came to Prof. Bo Kalling (the process' inventor and Stora's director of research) while probing for methods to desulphurize basic (Thomas) bessemer steels. Substantial success with a rotating furnace made it a logical step to combine such controlled stirring of the bath with the introduction of oxygen.

The present furnace is located at Stora's Domnarfvet steel plant in central Sweden. It was built in 1954 as part of this plant's expansion program. Stora Kopparberg Bergslags

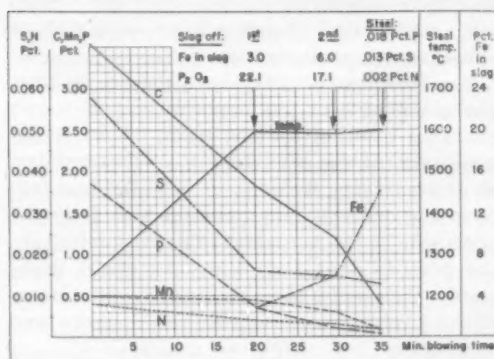
By TOM CAMPBELL,
Editor-in-Chief

A/B (more than 650 years old) is one of Sweden's largest industrial enterprises—and perhaps the oldest industrial concern in the world. The new Kal-Do furnace was made the same size as the Thomas converters and the electric furnaces—both of which units have a capacity of 30 tons. This enabled good cost comparisons.

The Kal-Do process uses typical high phosphorous irons of Sweden but it will work equally as well (and faster) with American low phosphorous iron. The Domnarfvet furnace has a blowing cycle of 35 to 40 min. That applies because of the necessity to have two slag-offs in the phosphorous reduction. It is also due to taking tests, etc. With low phosphorous iron it is expected that blowing time will be about 25 min.; with tap-to-tap cycle about 40 min. Even with high sulphur iron, tap to tap will be no more than 45 min.

The oxygen is introduced into the furnace through a central opening in the top of the furnace—the latter has the shape of a conventional bessemer converter. The opening also serves as an outlet for exhaust gases. The position of the vessel as it rotates—and as the bath is stirred and the slag balanced—is at an angle of 15 to 20 degrees from horizontal.

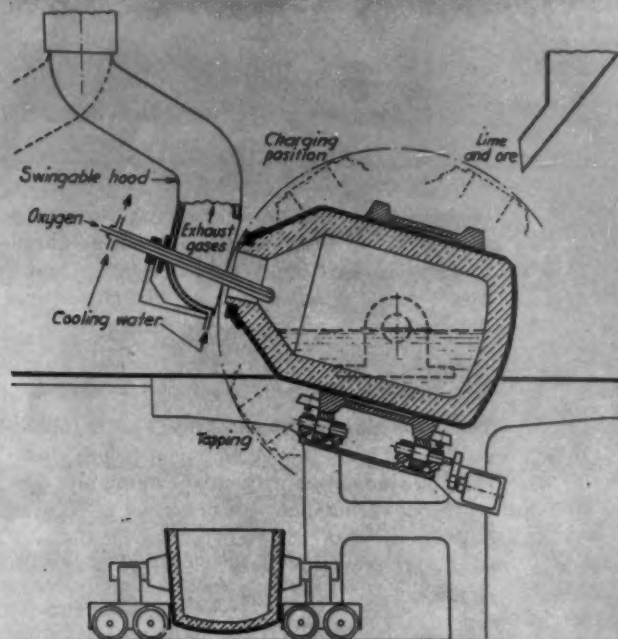
That position of the furnace while rotating



TYPICAL HEAT of high phos iron in rotary converter. Low phos heat would take 25 min. blowing time.

gives a greater exposure to the bath. It allows the oxygen to do its work over a large area of the bath. The agitation continuously changes the surface of the bath which results in a complete and uniform stirring of the metal. This rolling action of the metal results in rapid dephosphorization and desulphurization—while the carbon in the bath remains high.

Other factors presenting advantages of the K-D process include: quiet and rapid elimination of phosphorous; uniform heat with carbon



Left—30-TON FURNACE in blowing position. The furnace has a blowing cycle time of 35 to 40 min. With low phosphorous iron it is expected that blowing time will be about 25 min.



Top—OXYGEN BLOWING PLANT is controlled by two men. The position of vessel during rotation—and as bath is stirred and slag balanced—is at an angle of 15 to 20 degrees from horizontal.

monoxide burning inside the vessel (heat economy), and control of carbon in the bath without subsequent recarburization.

The drawing (p. 127) shows the ore or scrap charging chute on the opposite side from the charging position for hot metal. That is not necessary. It was the result of a space problem at Domnarfvet. Subsequent installations will have the ore and limestone charged from the same side as the hot metal. That will eliminate the present need for tilting the vessel backward; then only three positions will be required; charging, rotating (blowing) and tapping.

Stora's K-D process has another novel claim: compared to regular bessemer converter operation its lack of heavy brown iron smoke would be a joy to smoke regulation adherents. During the first third of the heat this method uses

water in the process which cools the bath. Less iron is oxidized by intense heat, thus less goes up the stack.

That factor not only adds to the iron in the bath but it makes elaborate cleaning equipment unnecessary. When iron ore is used to cool the bath the steel picks up about 7 pct of its weight in Fe from the ore additions. Calculated on charged pig iron, the yield on molten steel is about 92 pct. If you add to this the 7 pct Fe reduced from the iron ore addition—then you have about a 100 pct yield calculated on an overall metal basis.

This new oxygen steelmaking setup is the talk of the town in Domnarfvet. It is the "baby" to all steel people in the plant and in the town. And it is the reason why Professor Kalling (process Kal-Do from Kalling and Domnarfvet) and his able assistant, Folke Johansson have

ANALYSIS OF 10 LOW CARBON HEATS IN ROTARY OXYGEN CONVERTER

(Using Ore as Cooling Medium)

Heat No.	Short Tons Hot Metal	(Pct of Hot Metal)		O ₂ **	Tapping Temp. °F	Steel Before Tapping				
		Ore*	Lime			Pct, C	Pct, Mn	Pct, P	Pct, S	Pct, N
116	29.8	9.9	14.0	2250	2980	0.04	0.06	0.022	0.016	0.002
117	31.3	12.9	14.3	2570	3000	0.03	0.07	0.022	0.012	0.002
118	31.3	11.7	14.3	2240	3000	0.03	0.09	0.026	0.012	0.002
119	29.7	11.1	14.9	2200	3000	0.03	0.09	0.021	0.012	0.002
120	30.0	11.5	13.9	2200	2990	0.03	0.08	0.021	0.017	0.002
121	30.8	11.3	13.5	2370	3000	0.02	0.07	0.021	0.016	0.003
122	31.0	12.5	14.4	2000	2830	0.05	0.18	0.033	0.016	0.003
123	30.7	12.0	15.4	2220	3000	0.04	0.10	0.021	0.015	0.003
124	30.6	12.0	14.5	2080	2970	0.05	0.09	0.019	0.020	.....
125	30.0	11.6	13.9	2070	2980	0.03	0.11	0.016	0.018	.....

* 55% Fe

** cubic feet per short ton

The Stora Kal-Do Process at a Glance

What is the process?

It is a rotary oxygen method for making steel. Vessel is similar to the bessemer converter. Oxygen is introduced into the furnace through a central opening which also serves as an outlet for exhaust gases.

Is the vessel upright or tilted?

During rotation and steelmaking the vessel is positioned 15 to 20 degrees from horizontal; this exposes a large reactive area to oxygen impingement. Vessel rotates at 30 rpm during major steelmaking phase.

What about oxygen purity?

Process uses 97-98 percent pure oxygen. Will operate on less purity without nitrogen con-

tamination of steel. Average oxygen consumption: 2250 cu ft per net ton of steel produced. Lance is cooled by water and extends about 2 ft into vessel at an angle 3 to 5 deg larger than the angle of the furnace (see diagram).

Why the rotation?

That's the main attribute of process. It rapidly rotates the bath, producing homogeneous chemical and slag action without splashing and concentrated turbulence. Phosphorous is reduced quickly—in time to catch carbon on the way down. It also produces excellent slag-bath balance.

What about additions?

Iron ore (55 pct Fe) is added to cool the bath. Use of iron saves scrap and boosts iron in finished steel. Average ore addition: 14.0 pct of hot metal. Lime additions: average 13 to 14



DIFFERENCE between basic bessemer blowing (r.) and new oxygen converter (l.) is shown here.

spent many of their nights on the steel plant charging floor. Recently, as test after test demonstrated consistently routine repetition, those who have worked for more than 8 years on the problem are showing up at home more often.

This idea of spinning the bessemer vessel at a speed of 30 rpm gives rise to many advantages. The speed can be varied as different chemical changes are desired. The oxygen can be shut down and the rotation continued. To visualize this furnace without actually seeing it: remember the man on his back at the circus revolving a barrel at a fixed level by manipulating his feet. That's what a massive roller bearing set-up does with the vessel.

What about cost? Recent checks on steel-making costs with the Stora K-D process com-

percent of high phos hot metal. See table I.

Is the method commercially successful?

It has been since May 1956. The furnace is part of regular steel productive capacity at Stora's Domnarfvet plant. Steel has been used in making ship plates, shapes and cold drawing quality steel sheets.

What about steelmaking costs?

Cost studies at Domnarfvet show that Kal-Do steel was more than \$3 a ton cheaper than steel made in Stora's electric furnaces: the figures were double checked.

Is the process patented?

Yes, patents have been granted in major countries of the world. Stora Kopparberg's American subsidiary is located in New York City.

pared with the electric and Thomas bessemer steelmaking costs at Domnarfvet sent Professor Kalling's men back to check their figures. Not because the costs were higher. But because the difference per ton in favor of the K-D method was startling. It was more than \$3 a ton cheaper.

Installation and construction costs are comparable with the regular bessemer converter. The cost of machinery for rotating the vessel is not a large item in the overall expense. While the Domnarfvet plant has one rotating setup and two vessels, Professor Kalling envisages two rotating mechanisms and three converters. One can be relined while the others are in continuous operation.

A question often asked: Can carbon be caught at whatever point the melter wants without recarburization with its possible dirt or inclusions? The answer for Kal-Do is "yes." Since the phos drops very rapidly (p. 128) while the carbon remains high it is no matter to control the carbon content. American low phos iron with high sulphur would require a slag-off five or ten minutes after the blowing starts in order to lower the sulphur (the phos comes down rapidly) with the same slag. This will add but five minutes to the overall tap to tap cycle.

No limit on tonnage

The K-D process shows a saving in oxygen consumption and use: it can operate well on 97 pct O_2 . Still it produces a steel extremely low in nitrogen (0.002 pct blowing with 97 pct O_2). Experiments indicate that oxygen with a lower purity content can be used successfully without nitrogen contamination. There are many records of 0.001 pct nitrogen.

There is no limit of 30 tons placed on the Stora K-D converter. The process will operate satisfactorily in larger converters—a 100 ton job has been mentioned; and plans have been drawn.

Rotating of the bath starts out at 5 rpm and steps up to 30 rpm. There is a constant but quiet turbulence that carries out uniformly the chemical reactions between the bath and the slag. That is an important feature since it keeps the amount of iron in the slag low and steps up the iron in the bath.

The top of the converter through which the lance passes, is cooled by water as is the lance itself. The cooling of the area around the nose of the converter prevents excessive refractory erosion. Experiments are to be made with magnesite linings now in common use in this country, with the expectation of longer life.

Because of fast dephosphorization and desulphurization, the K-D process compares favorably with open hearth steel; except that initial investment would drop for the rotary process.

Cast Plastic Tools Hone Gears Fast

♦ Improved running characteristics in service can result with gears honed by plastic tooling . . . A one minute honing cycle is said to improve tooth form and surface smoothness sufficiently to substantially reduce gear noise.

By W. G. PATTON, Engineering Editor



PLASTIC honing tool impregnated with abrasive meshes with workpiece to deburr, and smooth.

♦ Tooling is precision cast in abrasive-impregnated plastic . . . New equipment designed to work with these gear-shaped tools is said to lower honing costs in both high and low volume production situations.

♦ HARDENED gears now can be honed to quiet-running smoothness with abrasive-impregnated, cast plastic tools. Nick-free gears result, in addition to an improved surface finish. Small errors in spacing, profile lead or eccentricity caused by heat treatment also are corrected.

All this is possible at low cost in both high and low volume production, it's said. Two new gear honing machines plus accompanying tooling developed by National Broach and Machine Co., Detroit, do the trick. The equipment rapidly and accurately finds and removes nicks and burrs from both sides of toothed workpieces.

Hones both faces

In the process, the unhoned but hardened gear runs in mesh with an accurately cast, abrasive-impregnated helical tool. Tool and workpiece spin at high speed against one another in crossed axes relationship. The impregnated plastic honing tool drives the hardened gear.

In the honing operation, the hardened gear reciprocates back and forth across the gear-shaped tool. During the cycle, the work gear is run in both directions. The process is adaptable to manual, semi-automatic or fully automatic loading.

Abrasive content of the plastic tool is selected to fit the application. Up to now, 40 to



SET for manual loading, this equipment improves tooth form, surface finish speedily and accurately.

80 grit abrasives have been used for most gear finishing operations. Experimental work has been conducted with grit beyond these limits.

The precision cast honing tools are a throw-away type, patented and produced by National Broach.

One of the two recently announced machines is equipped with a fully automatic loader. It's designed primarily to remove nicks and burrs and to make minor gear tooth corrections at a high rate of production.

In this machine, gears hone under low backlash conditions with optional brake loading. The machine has a high speed tool drive. Head and tailstock spindles rotate at more than 3000 rpm, if necessary. Mist lubrication is used.

A second machine may be selected if more tooth correction is necessary. Manual, semi-automatic or fully automatic loading may be used. With manual or semi-automatic loading, gears up to 8 in. pitch diameter may be honed. Fully automatic loading is available for gears up to 3 in. pitch diameter.

The machine is designed to have zero backlash and a self adjusting table. Headstock and air powered tailstock mount on a tilting table attached to the reciprocating worktable

through a hinged mechanism at the rear. In this arrangement, head and tailstock can lower either manually or automatically to bring the gear into mesh with the honing tool.

After loading, the table tilts upward into zero backlash position and locks. The tilting table also can lock out for honing under low backlash position with brake loading.

As seen in the illustration directly beneath, a manual air valve control (left) controls tilting of the worktable. Tailstock operation is controlled by the manual air valve atop the tailstock cylinder at right. The machine is set up for honing manually loaded automotive transmission helical gears.

Hones up to 0.002 in.

The honing process is designed to remove metal up to 0.002 in. over pins. At the same time, small corrections in tooth form and lead are accomplished. Nick and burr removal plus improvement in tooth form and shape are said to result in substantial improvement in the noise characteristics of the hardened gear while in service.

It's claimed that a one-minute honing cycle will remove nicks and burrs, smooth the surface and improve tooth form.

The new process applies only to hardened gears. Present methods of bobbing or shaping followed by shaving should be used. After heat treatment, the locating holes and faces of the hardened gears should be ground in the usual manner. Gears then undergo honing as outlined previously.

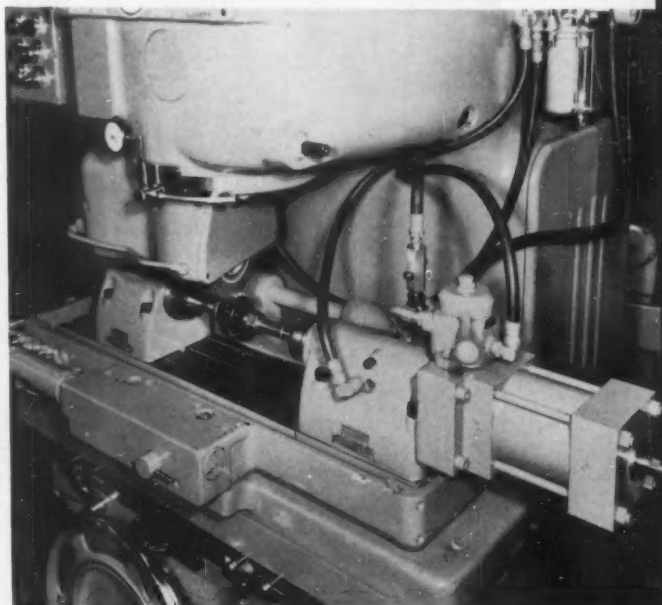


TABLE tilts on hinge (1.) to bring honing tool into surface contact with helical gear.

Even clay-bearing—

Improved Mold Sands

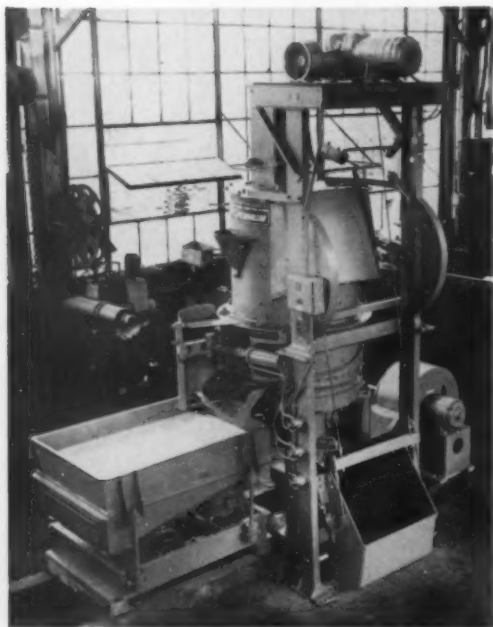
Drop Shell Casting Costs

By O. W. WINTER, Manager
Shell Mold Div.,
Beardsley & Piper, Chicago, Ill.

Part II

♦ Resin-coated sand has largely superseded the dry resin-sand mix formerly used in shell molds . . . Improved cold process coating equipment now encourages use of the less costly sand in low as well as high volume shell casting.

♦ Successful use of clay-bearing sand promises still another reduction in costs of shell mold casting . . . It's satisfactory to use even subangular, clay-bearing bank sands, at \$3 a ton, instead of \$10 per ton material.



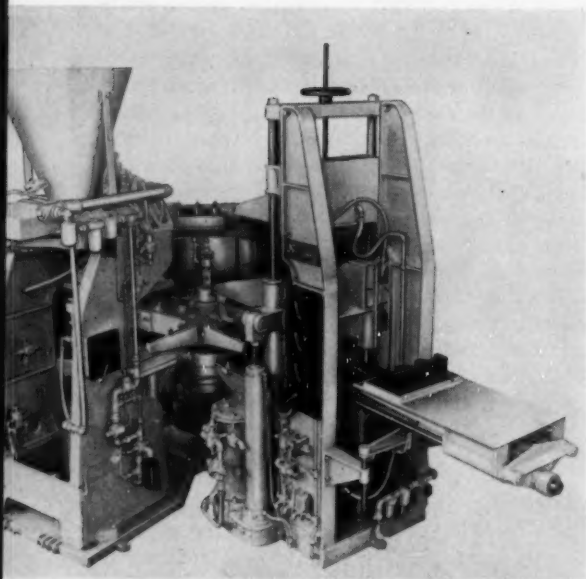
HOT process mulled sand machine produces about 2400 lb of resin-coated sand per hour.

♦ COST of resin for binding mold sand undoubtedly has retarded full acceptance of the shell molding process. Resin manufacturers have reduced prices substantially in the past five years; this has helped. Availability of resin coated sand probably is more significant.

Sand cost for shell molds has also dipped most pleasantly. Shell molders last year fretted over recommended use of washed or clay-free, round-grained sand which costs up to \$10 per ton. Recent advances now make possible specifying subangular, clay-bearing sand at \$3 a ton. The less expensive sand may even excel performance of the previously used material in some important respects.

Earlier, resin and sand were mixed dry with one another, just before molding. In contrast with the results of this now obsolete technique, each particle of sand processed by new methods is coated uniformly with a thin film of resin. Other advantages include elimination of dust and

This is Part II of a two-part article. Part I, dealing with modern shop practice in shell casting, appeared in *The Iron Age*, October 11, 1956, p. 108.



HIGH production equipment turns out 300 boxes of shell molded cores hourly with one operator.

separation problems, as well as reduced sensitivity of treated sand to moisture.

A strong point in favor of hot or cold coated sands is their lower resin content. With only half the weight of resin, shell molds of coated sand test to the same mold strength as those formed from dry mixes.

Obviously, halving resin content per mold materially reduces cost of each shell. Resin sells in the neighborhood of 28 cents per lb. Shell molds can weigh 100 lb or more, when thick and large in area—as required for heavy work.

Coat sand hot or cold

Two current methods exist for resin coating sand.

Field installations producing hot coated sand have operated since 1953. Equipment cost is a principal drawback to broader use of the hot technique. Thus far, such installations have been primarily limited to high production situations. However, at least one producer offers hot-coated sand for sale in quantities small enough to interest low-output foundries, and more are in the offing.

Within the past year or so, another sand coating method has sprung into relative prominence. This technique coats sand without use of heat, hence is referred to as the cold process.

By use of liquid resins or water-alcohol solvents, the cold process becomes more universally applicable than the hot. Low cost equipment capable of coating 600 to 900 lb of sand hourly is available, as is high production apparatus handling 2000 to 20,000 lb per hour.

Some cold coating is being attempted in con-

Problems In Making Shell Mold Patterns

Need for close tolerances

**Pattern and corebox expansion at 500°F
operating temperature**

Resin shrinkage on shell curing

Mold expansion on pouring hot metal

**Effects of shell porosity and elasticity on
gating, casting shaping, geometry of
mold cavity**

Variable shrinkage rate of casting

ventional mullers, but with results that leave something to be desired. Action of conventional mullers tends to ball the resin, rather than disperse it through the sand. Also, their mulling action usually takes longer.

To drive off all solvent volatiles, extra mulling usually is needed in standard equipment. This can and does result in chipping of the resin from the sand. In addition, resin freed by the crushing action later affects shell mold strength. Shell molds thus produced are weaker by a considerable margin than those from sand mulled in especially designed coating equipment.

One recourse to avoid overmulling, if conventional mullers must be used, is early discharge of coated sand. Then aerate the mass with hot air to drive off all volatile elements. This last step involves extra cost, of course.

Another important reduction in mold material cost involves successful use of clay-bearing, subangular bank sands instead of clay-free, round-grain sands. The latter formerly were thought necessary for good shell molds. Cost of clay-bearing sand runs about \$3 per ton, versus nearer \$10 a ton for clay-free sands.

These cheaper sands successfully resin-coat without being adversely affected by the clay content. When subsequently shell molded, they can perform even better than the formerly used clay-free sand. Perhaps because of clay content and the subangular grain, clay-bearing bank sands appear to provide greater hot strength than clay-free sands. Steel castings are now being successfully poured in shell molds made of clay-bearing sand containing 3 pct resin by weight.

Current explorations into various mold mix

**"... Sand additives
promise a mold that can make
better castings cheaper."**

additives will most likely bring about higher hot mold strength than now available. This in addition to bettering other mold properties.

Of particular significance among the additives are those that may improve mold strength even beyond the temperature at which phenol-formaldehyde resin burns. Such additives not only potentially hold forth the lure of further reduction of resin content in mold sand, but also promise a mold that can make better castings cheaper.

Development of fully automatic mold and core making equipment now available helps lower shell molding costs still further. One fully automatic three-pattern machine produces some 120 molds per hour. The one operator need only pick up finished molds. Another machine turns out 300 shell molded core box loads or blown shells hourly.

Another trend encouraging lower shell casting costs is use of contour clamping. The technique employs shell molds with specially contoured backs, usually formed by hot or cold blowing equipment. Mold backs press either against one another, or against metal plates with similar contours.

In the latter case, the shell mold acts in effect as a liner for a permanent mold. Stack molding typifies the other technique. In stack molding, opposite sides of each shell serve as cope and drag respectively for adjacent mold cavities.

Such molds can and are being poured today. One automotive manufacturer currently casts valve rocker arms in this fashion.

Blow twin patterns

When the contoured shell is used as a liner, forming it on a cold contour blow plate amply controls accuracy of the shell backs. In producing shells for stack molding, forming by the hot double pattern technique is required, when cope and drags are produced on opposite sides of the same shell.

Labor cost is a major factor in most industrial operations, and shell molding is no exception. One of the great advantages offered by shell molding is easy automation. Shell molds weighing only 5 pct as much as equivalent green sand molds permit automatic production and handling by relatively inexpensive equipment. A low labor cost per mold results.

All cost factors considered, in modern shell molding practice a worker can lay down a mold ready for pouring at costs comparable to those of a green sand mold. Often shell molds cost less than green sand molds.

Of even greater importance than blowing shell

molds is the fact that resin coated sand permits blowing of shell cores. Resulting dense and strong sand structure in the blown core enables close accuracy, dimensional stability and better finish on the casting than from shell cores made by gravity dump procedures. Its greater strength also permits a thinner core wall containing less resin. All this means lower core material costs.

Use of shell cores is not limited to shell molds alone. They can be used in any kind of mold: green sand, dry sand, and permanent.

Holes produced by blown shell cores are reportedly being held to tolerances of ± 0.001 in. per inch. Since costs associated with internal machining usually are higher than with external machining, magnitude of savings here in reduction of machining is quite significant.

Save on cores

Aside from better and more accurate castings, shell cores offer other foundry advantages. Usually hollow, they vent naturally to eliminate porosity and gas blows in the castings. This hollow construction also provides important savings in use of sand and resin binder.

Collapsibility of the core can be consistently and accurately controlled by varying one or more of several factors, such as resin content, degree of cure and core wall thickness. Type of sand and additives employed can also serve to effectively govern collapsibility.

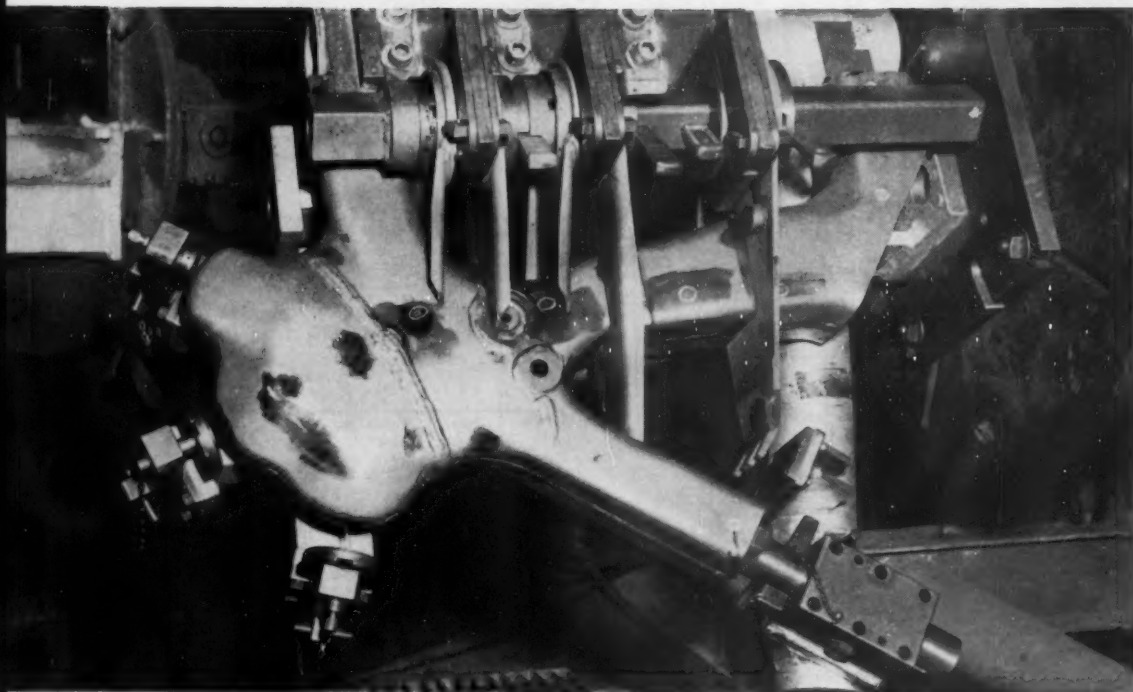
High strength of a shell core makes feasible such economies as elimination of reinforcing wires, rods and chaplets. Likewise, this strength encourages coring of smaller holes and narrower grooves than heretofore considered practical.

Many holes and recesses are produced in shell castings by the simple device of protrusions on the mold face. In other forms of molding, this would require use of cores. Holes in castings so produced include some with depth to diameter ratios of 4:1.

A shell core usually is ready for insertion in the mold as removed from the core box. An exception exists where cores semicure in the core box, then are removed to finish cure either in a furnace or by their own residual heat.

This latter practice prevails more generally in molding solid cores. This may occur where limitations exist on geometric shape, or with combinations of thin and thick sections—as in cores for automotive cylinder head water jackets. There, leaving the core in the box long enough to cure thick sections would overcure thin sections.

Shell cores take more handling than oil sand cores. This because of their harder surface, hence less chafing, and their lower dead weight. Nonetheless, the less handling the better. And under no circumstances remove cores from the box until sufficiently cured and rigid. Generally, it's good practice to place cores directly into the molds as they are taken from the hot core box.



PRECISION fixturing accurately holds four brace fittings to aircraft bulk-head center assembly.

Better three ways—

Weld Stronger Joints In Low-Alloy Steels

◆ Flash and fusion weld-fabrication can combine with use of high-strength, low-alloy steels to offer three possibilities . . . improved performance at similar costs, better use of materials at lower cost, or similar performance at less weight or cost.

◆ With the component construction method of assembly, high strength low alloy steel primary structures built up by welding can perform at strength levels in excess of 200,000 psi . . . Structures welded to 280,000 psi strengths are not remote.

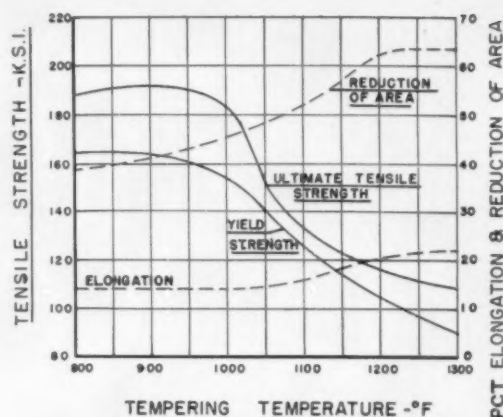
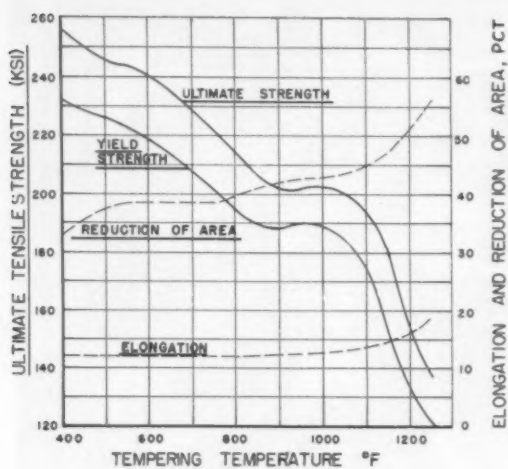
By R. D. LIBERT, Supervisor,
Research & Development Engineering Dept.,
Aeronautical Div., A. O. Smith Corp.,
Milwaukee, Wis.

◆ **HIGH-STRENGTH**, low-alloy steel structures have been fabricated in production setups by flash or fusion welding to ultimate strength levels of 220,000 psi. Current investigation includes flash welding experiments with selected high-strength, low-alloy steels heat treated to 280,000 psi levels.

These strength levels, coupled with other beneficial properties, signal a promising future for such materials. The practicality of fabricating by flash and fusion welding has recently heightened the interest of many product engineers. This last for several reasons.

Following fabrication or other forming operations in an annealed state, high strength low alloy steels are conventionally quenched from high temperatures to develop desired high ten-

Parent and Weld Metal Properties Compare Well



AVERAGE mechanical properties of AMS 6428 steel (left) and E-502-16 welding electrode (right) when oil quenched from 1650°F and tempered at temperature specified.

sile properties. This step can result in distortion partially or completely destroying dimensional accuracy of the workpiece.

Properly executed, weld fabrication can help control the distortion problem. (See THE IRON AGE, August 30, 1956, p. 88.)

Holds distortion down

With distortion in hand, the road clears for use of alloys heat treated to high strength levels, even in such critical applications as aircraft primary structural assemblies. If they can be employed there, chances are good that high-strength, low-alloy materials also can prove more suitable than ever before for a wide range of construction and transportation equipment designs, as well as certain more specialized applications.

Often, too, weld fabrication results in more efficient use of material than previously possible with other standard fabrication techniques. In certain end uses this can result in high-strength, low-alloy steel parts costing no more than in carbon steel, but at the same time stronger and/or lighter.

Production of quality flash welds in high-strength steels requires consistent welds of maximum possible joint strength. The flash welding process alone does not guarantee this. Rather, attention to certain basic requirements is necessary: (1) Design of parts for flash welding, (2) Use of acceptable welding fixtures, (3) Use of the proper flash welding equipment, (4) Development of an optimum welding procedure, and (5) Adequate welding cycle control.

Parts to be welded must provide sufficient contact area to seat inserts firmly, and to insure

ample current carrying capacity to maintain flashing.

Parts geometry should make it possible to back up and hold parts securely during upset. Cross sections of each part must be the same for constant welding conditions. Metal allowance or overhang beyond inserts should be even to assure uniform flashing.

Provide the fixture with adequate clamping and backup blocks for proper holddown and fitup of parts. With contoured workpieces to be welded, adjustable backup blocks offer advantages. Fixtures must be supplied with locators for aligning parts in the fixture, and the fixture in the machine.

Special attention must be paid the path of the electrical current through the fixture. Keep

TABLE I

	Fatigue Endurance Limits*		AMS 6428**
	Mean endurance limit, psi		Standard deviation psi
Parent metal	85,730		2,666
Flash weld	78,850		7,550

* Reversed flexural bending specimens; "Prot" accelerated test with 0.01 psi/cycle loading rate.

** Heat treated to 160-180,000 psi tensile.

TABLE II

Allowable Design Stresses for Flash and Fusion Welded AMS 6428

Type of Weld	Type of Loading ⁽¹⁾	Allowable Stress, psi		
		Parent Metal ⁽²⁾	Weld Zone	
			Heat Treated After Welding ⁽³⁾	Stress Relieved After Welding ⁽⁴⁾
Fusion Welding: butt or fillet using E-502-16 electrode	Tensile strength	180,000	144,000 ⁽⁵⁾	130,000 ⁽⁶⁾
	Compression yield	165,000	144,000 ⁽⁷⁾	130,000 ⁽⁷⁾
	Shear strength	105,000	86,000 ⁽⁸⁾	78,000 ⁽⁸⁾
Flash Welding	Tensile strength	180,000	144,000	Not used
	Compression yield	165,000	144,000 ⁽⁷⁾	
	Shear strength	105,000	86,000 ⁽⁸⁾	
Spot Welding ⁽⁹⁾	Shear strength	105,000	TAB 2.6126(A) ANC-5A	TAB 2.6126(A) ANC-5A

⁽¹⁾ Static loads only; fatigue not considered.
⁽²⁾ Production items heat treated in 180-210,000 psi range.
⁽³⁾ No "heat-affected" zone present if heat treated after welding.
⁽⁴⁾ Includes weld area plus heat affected zone.
⁽⁵⁾ Based on 85 pct of minimum laboratory value (170,000 psi).
⁽⁶⁾ Based on 85 pct of minimum laboratory value (153,000 psi).
⁽⁷⁾ Values assumed equal to tensile strength.
⁽⁸⁾ Ratio of shear/tensile strengths assumed 0.60.
⁽⁹⁾ Spot welding used in shear only.

impedance low to assure ample current carrying capacity. Make sure also that the fixture is heavy enough to minimize deflection during upset. Ducts in the fixture supply a protective atmosphere surrounding parts being welded.

Welder size and required upset pressures depend on the workpiece cross-section, and the type of material to be welded. One rule-of-thumb rating allows 50 kva per square inch of weld area in steel. In welding alloy steels, upset pressure needed per unit area may exceed 15,000 psi. To withstand such high total upset forces, machine backups should form an integral part of the welder.

Pressure clamping part to fixture should not be excessive, since this may coin or distort the part. Recommended clamping pressure for steel ranges from 3000 to 5000 lb per square inch of insert contact.

Feed and upset actions may be actuated by

direct motor drive, air or hydraulic systems. Hydraulic systems generally supply greater flexibility in machine operation. Small, easily replaced hydraulic feed cams can produce any pre-determined feed curve.

The more desirable parabolic-type feed flashing curves encourage high welding efficiency and enable less loss of material in welding. Metal loss can drop to 50 pct of that normal to flash welding with a linear feed curve.

Simulate production conditions

In developing an optimum welding procedure, it's generally acceptable to use actual production parts. In some instances it's more feasible to employ simulated parts.

In development work associated with high-strength materials, full atmospheric protection within an enclosure should envelop parts being welded. This procedure most conclusively aids

TABLE III**Comparative Chemical Compositions**

AMS 6428	Element	SW-151* (E-502-16)
0.032-0.037	C	0.11
0.60-0.80	Mn	0.72
0.025 max.	P	0.020
0.025 max.	S	0.019
0.20-0.35	Si	0.54
1.65-2.00	Ni	0.30
0.70-0.90	Cr	4.75
0.30-0.40	Mo	0.50
0.17-0.23	V	—

* typical analysis

in maintaining high quality welds and in standardizing experimental work.

Preliminary acceptance or rejection of tentative weld procedures is made on the basis of tensile and fracture tests on the simulated weld. Tensile specimens are machined with the flash weld line in the center of the specimen. Fracture specimens are notched along the weld line, and tested while in the sub-critical annealed condition.

Based on the results obtained thusly, a final procedure is selected. Several welds made to these standards are destructively tested at the strength level of the actual part, again with the aid of tensile and fracture tests.

The goal is maintenance of high joint quality in production welding without need for destructive testing. All production welds are monitored by a direct recording multi-channel oscillograph. The equipment produces direct amplitude recordings of important variables. Recordings have a common time base with one another. It's thus possible to compare these factors with a known reference curve.

Compare welds with standard

A plus and minus envelope developed about a known reference curve (from data collected in the past) can be transferred to a transparency. It then serves as a master template to check subsequent weld curves. This process control mechanism with rigid magnetic particle and radiographic inspection makes possible production of high quality welded joints without destructive testing.

Proof testing of flash welds at 67 pct of ultimate strength is avoided. Experience has shown that a welding procedure properly developed and certified by tensile and fracture tests will not fail below the yield point.

In applying flash welding to aircraft structures, AMS 6428 steel and some titanium alloys have been used extensively. AMS 6428 is generally similar to SAE-AISI 4340 steel.

Application of AMS 6428 steel to flash welded hollow propeller blades embodies fatigue endurance limit as a primary design factor. For this use, the steel is heat treated to the 160-180,000 psi range. Endurance limit on the flash welded material compares favorably with that of the parent material. (See Table I.)

Heat treat weld

In flash welding main landing gear assemblies of heavy bombers, joints exhibit tensile strengths and ductilities comparable to the parent metal. The assembly is heat treated to 200-220,000 psi, ultimate tensile strength. Parts have been certified for production in this manner by the Air Material Command of the Air Force (see Table II).

Current research involves determination of the fatigue endurance limit of flash welded AMS 6428 at strength levels of 200,000, 220,000, 240,000, 260,000, and 280,000 psi, ultimate tensile strength. Dual sets of data will be obtained for air melted, aircraft quality AMS 6428, and for a vacuum melted heat.

With AMS 6428 steel joined by fusion welding, filler metal is of the 4 to 6 pct chromium, 0.5 pct molybdenum type (see Table IIF). With this filler metal analysis, either metal arc or non-consumable electrode welding can be employed. In the former case, SW-151 (ASTM-AWS E-502-16) coated electrodes are used. A thoriated tungsten electrode is used with the latter joining method.

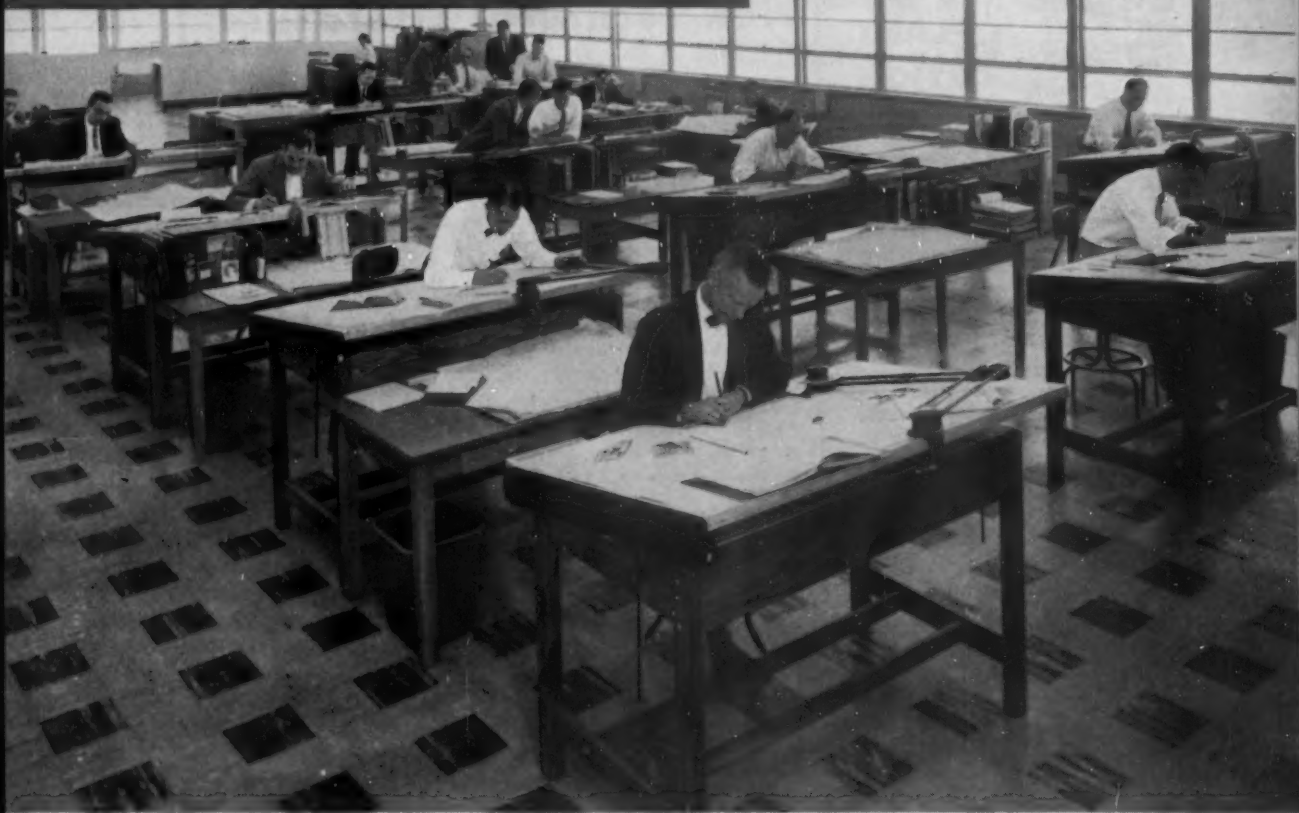
Typical fusion welded primary structures include a heavy bomber bulkhead with a strength level of 180-210,000 psi and the main landing gear assembly for a heavy bomber, heat treated to a strength level of 200-220,000 psi.

The component construction method of assembly uses precision contour-rolled and forged parts, and results in a quality assembly of minimum weight and high strength. Precision fixturing of component parts is frequently essential in welding a subassembly. Result is a structure requiring little machining of the final welded assembly. Rigid surveillance carried on by the inspection department and metallurgical laboratory assures final high quality welds on production items.

During subassembly stages, welded components are furnace stress relieved in fixtures. Controlled heating and cooling cycles help create the best possible dimensional control in all stages of assembly. The final welded assembly is likewise heat treated by free quenching in a hot oil bath to minimize quenching distortion. Assemblies are tempered in fixtures after quenching.

Curves preceding show effect of varying temper conditions of parent and weld metals.

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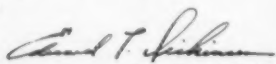
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For free copy circle No. 1 on postcard p. 145

Swaged wire rope

Just announced is a new catalog of many swaged wire rope assemblies. These assemblies consist of a length of preformed wire rope with a terminal attached to one or both ends. Each end can be a different terminal fitting such as a threaded stud, oval eye, pin eye, clevis, hook, fork, turnbuckle, etc. The 24-page catalog gives all dimensions, drawings, capacities, sizes of both terminals and wire rope. *Macwhyte Co.*

For free copy circle No. 2 on postcard, p. 145

Weldrawn tubing

Weldrawn tubing, made by forming cold-rolled strip into tubing, fusion welding the edges and cold drawing to size, is described in a data memorandum just published. Sizes listed in a table of analyses and production limits are from 0.0625 to 2.500 in. od, depending upon the analysis. They include nine types of stainless steels, Monel, Hastelloy "C", Nichrome "V", beryllium copper, Constantan, 42 pct nickel iron, 52 pct nickel iron and unalloyed titanium. A photomicrograph of the juncture of parent metal and weld area in this tubing shows complete recrystallization of the weld area as a result of cold working and annealing. *Superior Tube Co.*

For free copy circle No. 3 on postcard p. 145

FOR YOUR COPY

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, page 145.

Diesel engines

Turbopower diesel engines made by a major manufacturer are described in an illustrated brochure. Specifications of industrial and marine models ranging from 159 to 300 bhp are fully described along with features of design and performance data. *Detroit Diesel Engine Div., G.M.*

For free copy circle No. 4 on postcard p. 145

Manufacturing facilities

One company has published a folder describing its services for design, development and manufacture of screw machine products and cold upset parts. It cites examples of the diversification of products manufactured at the company, including a complete assembly designed, engineered and manufactured for a leading manufacturer of hydraulic lift chairs. Additional information lists complete secondary operations available, machine capacities and background information on the firm. *Chicago Screw Co., div. of Standard Screw Co.*

For free copy circle No. 5 on postcard, p. 145

Vane actuated switch

Specification sheets describe and illustrate the Brown Electr-O-Vane control unit, a precision electric switch actuated by the infinitesimal torque of 2 gram-in. or less. *Industrial Div., Minneapolis-Honeywell Regulator Co.*

For free copy circle No. 6 on postcard p. 145

Tractor shovels

Pair of bulletins offers data on one company's line of tractor shovels. Separate literature gives details and specifications on two four-wheel-drive $1\frac{1}{2}$ and $1\frac{3}{4}$ cu yd handlers. Each has fully power-shifted transmission, torque converter drive, planetary final drives, torque-proportioning differentials, 40° bucket break-out at ground level, powerful pry-out action, longer wheel base for greater stability, four-wheel hydraulic brakes (power brakes on the $1\frac{3}{4}$ cu yd model), closed pressure-controlled hydraulic system, and a double-acting hydraulic system: *Frank G. Hough Co.*

For free copy circle No. 7 on postcard p. 145

Crane scales

Anyone that desires to weigh, or check weigh on their crane or hoist is expected to be interested in a new catalog. It shows graphic illustrations of various kinds of weighing that can be done with a particular scale on a crane or hoist. Standard, angle face, batching, kilogram and kilogram-pound models, are clearly pictured. The literature says this type scale on a crane or hoist will weigh anything the crane can lift. A central weighing station is not necessary with this scale. The catalog says 110 models are available. *Hydroway Scales, Inc.*

For free copy circle No. 8 on postcard, p. 145

Control valves

Pilot operated control valves are explained in a colorful folder. These valves, it states, represent an important departure in valve design, manufacture and performance. Built to JIC standards, they have a valve body machined from a casting of Navy M bronze. The valves have a hard-chrome plated stainless steel stem and are 100 pct bubble tested under water. Solenoid coils are covered with molded epoxy resin and are guaranteed against coil burnout for the life of the valve. Normal service life of the valves, the folder says, is conservatively estimated at over 25-million cycles. *Valvair Corp.*

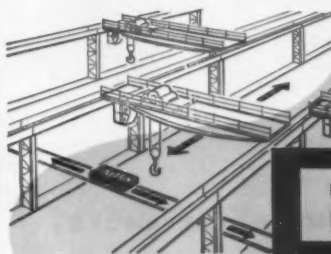
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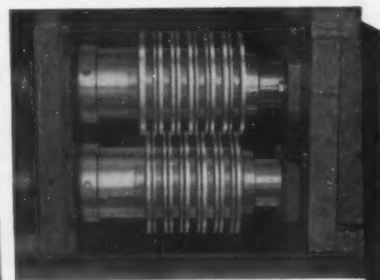
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NOW, FOR THE FIRST TIME you can get a brilliant, decorative finish directly on zinc die-cast parts . . . without mechanical finishing, without electroplating! The luster is provided by the *chemical polishing* action of new Iridite (Cast-Zinc-Brite) solution. Even surface blemishes, such as cold shuts, are brightened by this new process. No electrolysis. No special equipment. No specially trained personnel. Just a simple chemical dip for a few seconds and the job is done. And, this new Iridite has been *tested and proved* in production.

CORROSION RESISTANCE, TOO! New Iridite (Cast-Zinc-Brite) provides exceptional corrosion resistance for bright-type chromate finishes . . . also guards against blueing or darkening by eliminating zinc plate formerly required in bright chromate finishing of zinc die castings.

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LET US SHOW YOU what Iridite (Cast-Zinc-Brite) can do for you. Send us at least a half-dozen typical zinc die-cast parts for **FREE PROCESSING** for your own tests and evaluation. Or, for immediate information, call in your Iridite Field Engineer. He's listed under "Plating Supplies" in your classified 'phone book. **IMPORTANT:** when you give us samples for test processing, please be sure to identify the alloy used.

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FREE LITERATURE

Rotary gang slitters

Rotary gang slitters for mills, warehouses and strip users are featured in a 16-page booklet. Included are numerous photographs showing actual slitting operations as well as tables of cutting capacities and machine specifications. Both sheet and coil slitting methods are summarized with explanations of drive and pull-through slitting operations. A complete section is devoted to various types of recoiling equipment and methods, including many recent engineering developments. *Stanat Mfg. Co., Inc.*

For free copy circle No. 10 on postcard p. 145

Carbide-tip drills

Masonry drills folder shows size range in spiral flute, fast cut and extra length drills. These high quality drills are carbide tipped. The popular sizes are available with 1/4-in. shanks for use in portable drills having 1/4 in. capacity chucks. Drills penetrate easily and quietly in concrete, cement, brick, slate, marble, stone and all types of masonry materials. They produce clean sharp edged accurate holes without danger of breaking side-walls even when holes are spaced closely together. Spiral flutes carry the dust out of the hole, especially in deep hole drilling extending tool life by reducing heat caused by friction. *Chicago-Latrobe.*

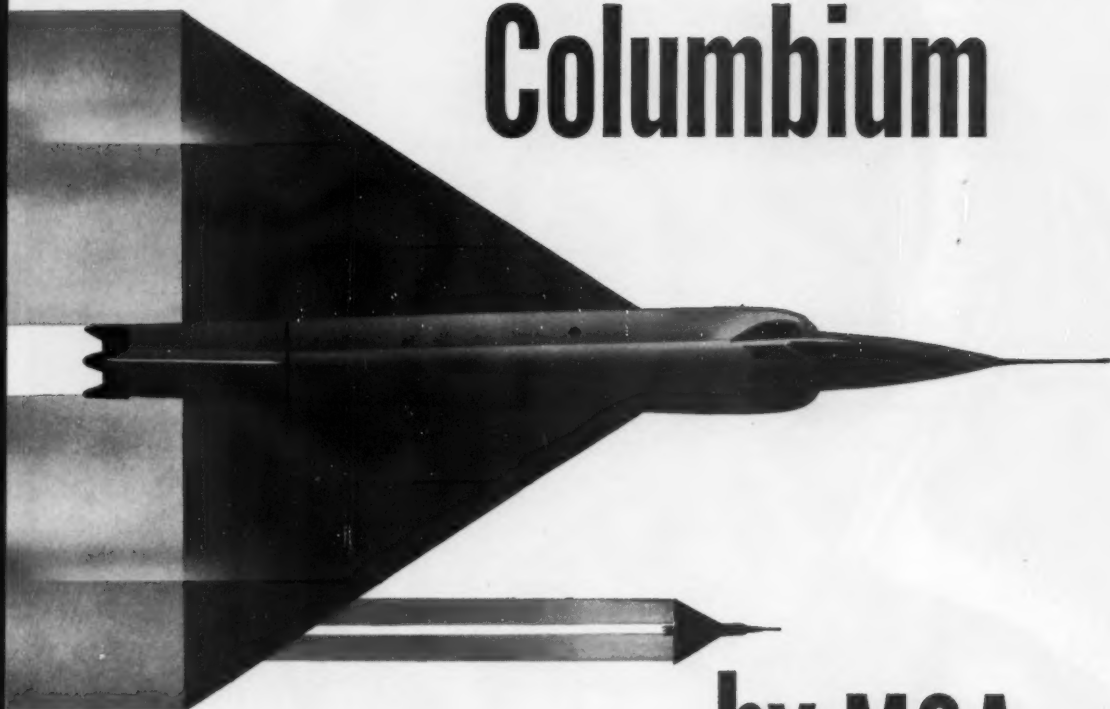
For free copy circle No. 11 on postcard, p. 145

Guide pin bushings

New line of guide pin bushings, notable for high resistance to wear and low coefficient of friction, is introduced in a bulletin. These guide pin bushings are made of a premium grade of aluminum bronze of high yield and tensile strength plus good ductility. It has a closely controlled composition of 10.5 pct aluminum, 3.75 pct iron, 0.5 pct special elements and 85.25 pct copper. Centrifugal casting followed by precision heat treating provides higher hardness, higher compressive strength and better fatigue values, the bulletin explains. *WW Alloys, Inc., Div. of Fansteel Metallurgical Corp.*

For free copy circle No. 12 on postcard, p. 145

Columbium



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permits design engineers and metallurgists
new latitude, the wide-open throttle

Alert design engineers may once more avail themselves of the special properties of columbium without fear of inadequate supplies. Severe requirements for highly stressed parts (such as turbine blading and exhaust manifolds) demand the best material, not near-substitutes.

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3A

FREE TECHNICAL LITERATURE

These publications describe money-saving equipment and services . . . they are free with no obligation . . . just circle the number and mail the postcard.

This section starts on p. 140.

Pressure transducers

New data sheet describes transducers which respond to any linear or non-linear function of pressure to position a pen or pointer through a self-balancing bridge circuit. Evenly graduated charts can be used for such variables as absolute, differential or gage pressure, level, flow and altitude. *H. E. Sostman & Co.*

For free copy circle No. 13 on postcard

Materials handling

Applications of materials handling equipment in the iron and steel industry appear in a special company publication just released. It highlights both raw materials handling up to the blast furnace and the handling of steel within the mill. It is profusely illustrated with specific applications of the company's equipment and engineering services dealing with all phases of materials handling problems in the industry. *Link-Belt Co.*

For free copy circle No. 14 on postcard

Induction motors

Large two pole squirrel-cage induction motors are described in a new six-page folder. Designed to meet requirements of today's high speed drives, these 900 hp and large motors, are described as ideal for boiler-feed pumps, pipeline pumps, centrifugal blowers, descaling pumps and similar applications. The folder contains several photographs and cut-away illustrations. Covered are features on ventilation, stator winding, split sleeve bearings, squirrel-cage winding, stator, adequate protection, rotor, capsule-type housing and end shields. *Allis-Chalmers.*

For free copy circle No. 15 on postcard

Blast cleaning

How to automate foundry cleaning rooms with an airless abrasive blast cleaning process is the subject of new literature. It is illustrated with tables and drawings and contains eight case histories from various facets of the foundry industry. Gray iron, malleable iron, aluminum, brass, shell moldings are all considered from the cleaning problem standpoint. Cleaning production data are included. *Wheelabrator Corp.*

For free copy circle No. 16 on postcard

Magnetic starters

Modification kits for magnetic starters are explained in a 12 page illustrated bulletin. It shows how to modify standard magnetic starters to fit special conditions. Includes how-to-do-it pictures of the installation processes with a push button and selector switch, auxiliary interlock, strongbox coil, third overload relay, and fuse clip kits. Color publication contains complete ordering information for each of the six kits which are available "off-the-shelf" for on-the-spot modification. *General Electric Co.*

For free copy circle No. 17 on postcard

Coil grippers

Coil handlers in several different styles are illustrated in a new bulletin. It describes one company's line of handlers featuring: heavy duty tong mechanisms, single rim gripping for heavy duty coils, double rim gripping, triple coil handling, motor driven grabs for core entry, diametral grippers, a coil turnover grab and many more. *Mansaver Industries, Inc.*

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FREE TECHNICAL LITERATURE

Speed reducers

A speed reducer engineering manual presents application information such as hp ratings, torque capacity, overhung load values, dimensions, construction features, installation and maintenance for single, double and triple reduction. Speed reducers may be driven by electric motors, gas, oil or diesel engines. *Westinghouse Electric Corp.*

For free copy circle No. 19 on postcard

Thermistors

Thermally sensitive resistors for automatic detection, measurement and control of physical energy, is announced in a newly revised 53-page manual. The publication describes the latest general, material and operating characteristics of the electronic semi-conductors, as well as general types of applications. Besides basic data, it also includes details on thermistor assemblies, static and dynamic characteristic curves in addition to user information on how to order them. *G. E. Metallurgical Products Dept.*

For free copy circle No. 20 on postcard

Automatic water filter

Automatic water filters are explained in a ten page color bulletin. Cut-away sections and drawings show filter's operation. Dimension charts and flow curves are given for all three sizes of the firm's filters. Some typical installations are pictured. *R. P. Adams Co., Inc.*

For free copy circle No. 21 on postcard

Scale remover

Electrolytic removal of scale and oxides from iron and steel, is discussed in literature just published. It introduces a new product that removes scale quickly with no chemical attack on iron or steel because of the chemical's alkaline nature. It states that the remover is particularly adaptable to plating lines and automatic equipment involving alkaline or alkali-cyanide plating solutions. In such installations, no acids are required and, therefore, equipment corrosion from acid fumes is eliminated. *Ethone Incorporated.*

For free copy circle No. 22 on postcard

Carbide tools

A selection from over 700 different carbide and carbide tipped tools regularly manufactured and stocked by one company is presented in a new catalog. Illustrated and with complete tabular matter and prices are carbide tipped side milling cutters, slab mills, face mills, shell end mills, tri-helix side milling cutters, slitting saws, fine pitch face mills, tri-helix face mills, shell milling cutter arbors, true spiral end mills, carbide tipped end mills, drills, and centers. The catalog is a condensed version of a larger catalog which will be available soon. *Nelco Tool Co.*

For free copy circle No. 23 on postcard

Sheet feeder

Brochure describes a new 125-sheet-per-minute metal sheet feeder. The feeder handles sheets ranging in size from 19 x 19 in. to 44 x 48 in. and from 20 gage (0.037 in.) to 38 gage (0.0062 in.) thick. The heavy duty machine supports loads weighing 6000 lb. Covered is information on major operating features, application data describing connecting conveyors, drive units, load beams, and air and vacuum pumps. *Dexter Folder Co.*

For free copy circle No. 24 on postcard

X-weld chain

Accoloy X-weld chain, a late major development in welding chain to resist bending, breaking, and kinking, is fully described in a new bulletin. It lists such use-applications as sling chains, banding chains, load binders, towing chains and boomer chains. This high-strength chain has been field-tested under severe service conditions. Weld area is 2¼ times that obtained with regular welding methods, to yield more than double security at the weld. In addition to specifications, weights and dimensions, a section describes properties and applications of specially manufactured heat-resisting and acid-resisting X-weld chains and X-weld studs. *American Chain Div., American Chain & Cable Co., Inc.*

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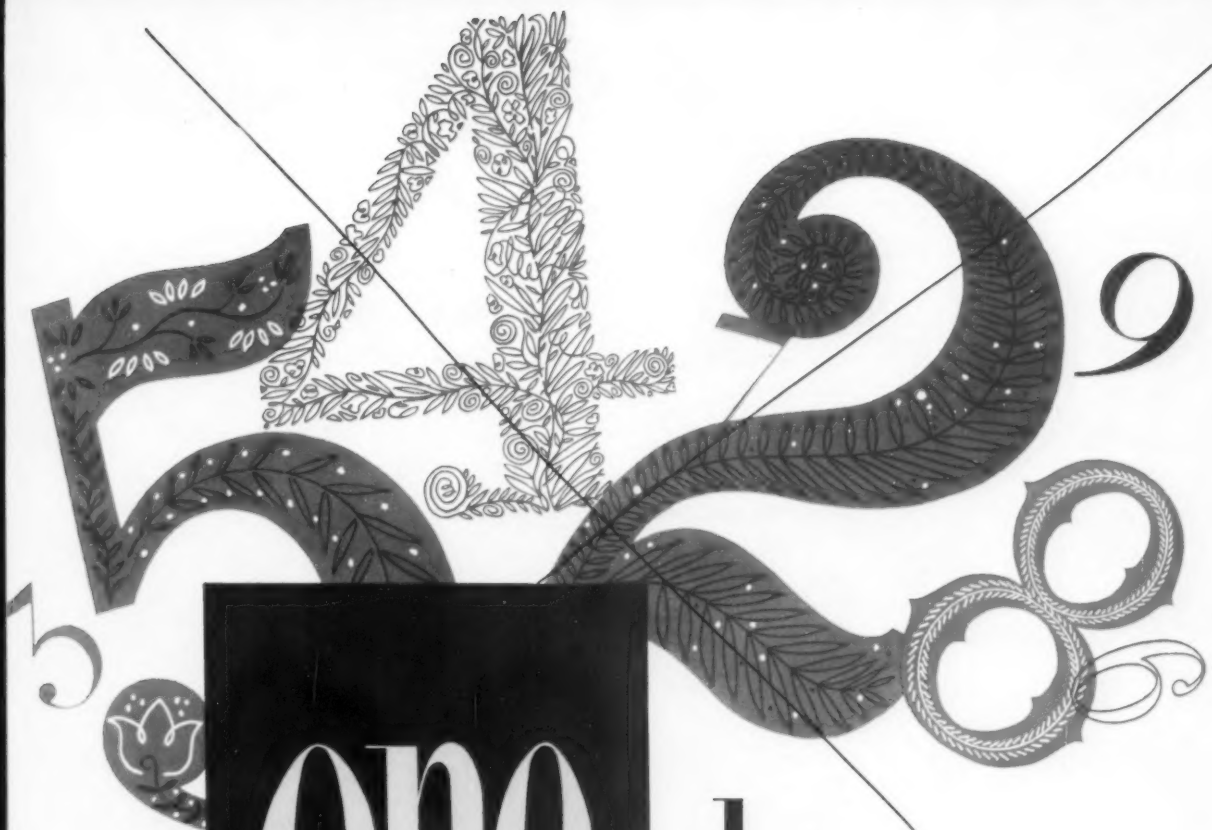
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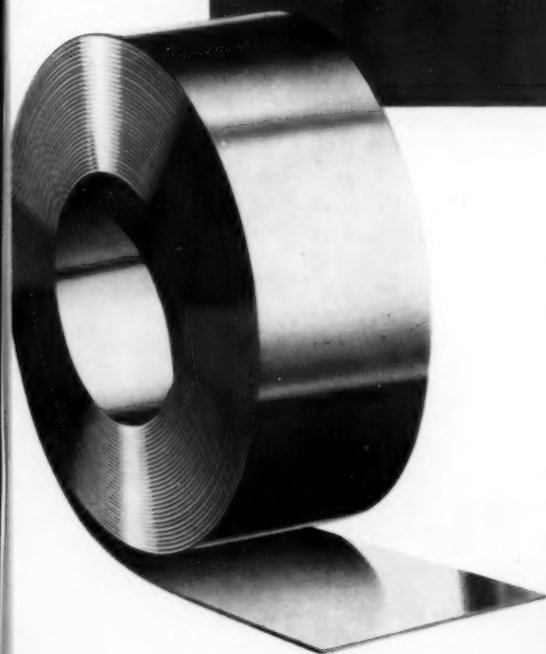


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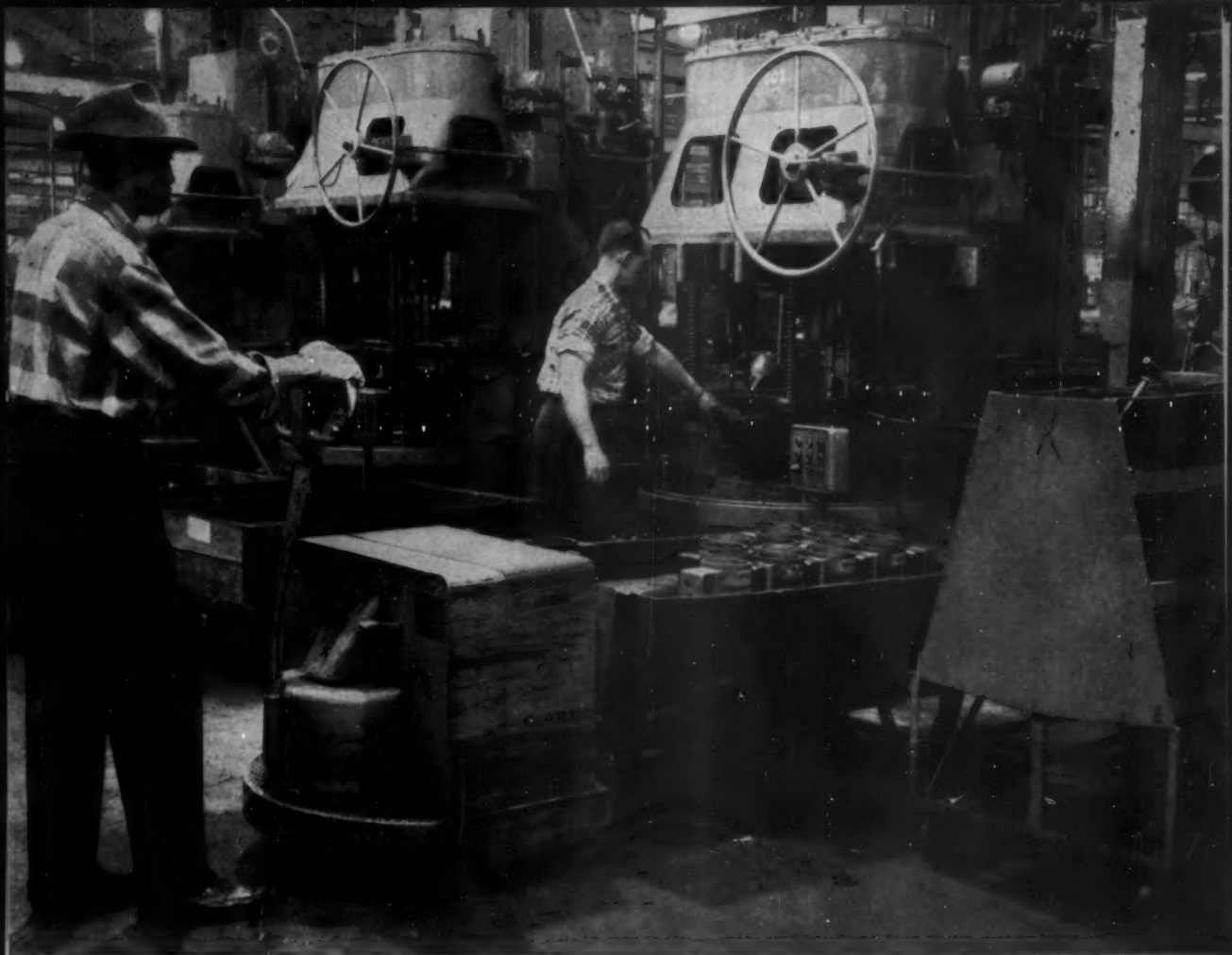


Users of Metal Blast's SUPER-ANNEALSHOT live "high off the hog"! For Metal Blast guarantees the most dependable quality of any abrasive on the market. Yet, because it takes advantage of all the economies of mass production, Metal Blast prices are right in line and, in some cases, lower! So, to begin with, you pay no more, but still get the savings inherent with top quality. We'd sure appreciate a trial!

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TECHNICAL BRIEFS

POWER: In-plant Gas Turbines

Broader use of gas turbines is promised with their recent invasion of the low horsepower field . . . New 1100 bhp units can generate power or drive equipment economically.

Low horsepower gas turbines are coming of age for economical inplant power generation and industrial mechanical drives. Newly designed units stretch the power range of commercially available gas turbines down to nearly 1100 bhp. Previously, gas turbines of less than 3500 bhp have reportedly not been available in the United States, except as experimental automotive powerplants.

It's estimated by Clark Bros. Co., Olean, N. Y., that over 40 of the new units working in this lower power range will see service shortly. Many installations will combine power generation or mechanical drive with generation of process steam. This brings their high thermal efficiency even higher.

Other Features, Too

In addition to broadening the gas turbine power range, the 1130 bhp design incorporates other features that characterize this type

WANT MORE DATA?

You may secure additional information on any item briefed in this section by using the reply card on page 145. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

of equipment generally. These include (1) simple construction and maintenance, (2) high starting torque, (3) flexibility in fuel requirements, (4) ruggedness and long life, and (5) light weight and compactness.

Light weight and small size permit installation where heavier equipment cannot easily be used. The complete gas turbine weighs about six tons. This makes it relatively simple to transport to such locations as above ground-level floors of multistory plants.



Air moves from compressor (left) through combustion chamber (foreground) and back through driving and power turbines. Gearing shows at right.

Compressor discharge, turbine inlet and compressor inlet volutes can rotate into 24 positions. The combustion chamber, too, can mount in a number of ways. Such flexibility permits choice of a wide range of installation setups.

Develops 1130 bhp at 80°F

The axial flow gas turbine operates on a simple open cycle. It develops 1130 bhp at 80°F and 1000 ft altitude. Output speeds of 1500 and 1800 rpm are available for driving 50 or 60 cycle generators. Other output speeds also may be specified.

The turbine normally operates at an inlet temperature of 1340°F. Use of alloys designed for this service help assure long life and dependability. The equipment can speed to full load within two minutes of starting.

Uses Stable, Elbow Chamber

Burning of liquid or gaseous fuel takes place within a stable, elbow-type combustion chamber. Use of a single combustion chamber helps avoid the matching difficulties associated with multiple chambers.

The turbine section consists of a high and a low pressure assembly, both two-stage units. The high pressure turbine operates at 11,500 rpm to drive the axial compressor. The low pressure turbine spins at 6000 rpm.

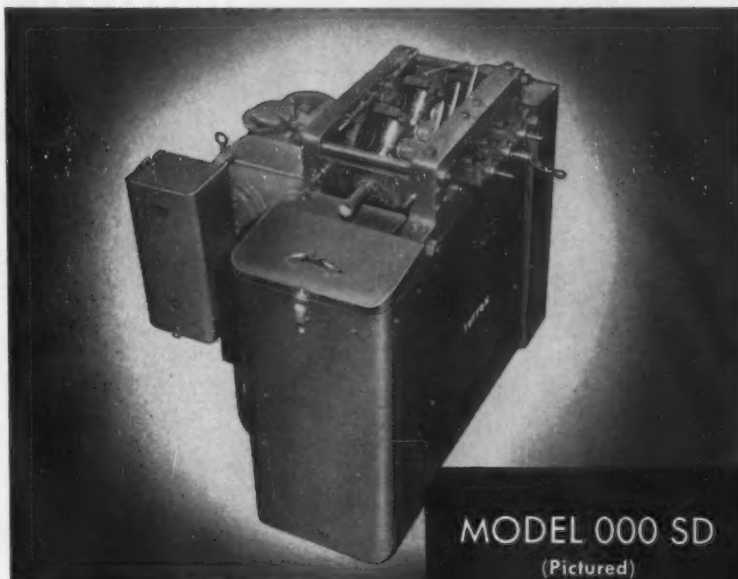
Maintenance Is Simple

Maintenance is relatively simple, due to careful attention to component accessibility. The combustion chamber liner need not be changed under ordinary service for the life of the turbine. Turbine or stator blades may be inspected within one hour after shutdown.

The cooling system minimizes chance of high temperature damage from rapid startup or shutdown. A turning gear is not required for cooling the unit after shutdown.

Clark Bros. will manufacture the 1130 bhp gas turbine under a licensing agreement with Ruston-Hornsby, Ltd., Lincoln, England.

NEW SUTTON *Syncro-Drive* STRAIGHTENERS



MODEL 000 SD
(Pictured)

- ENTIRELY GUIDELESS
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UP TO 400 FEET PER MINUTE
- ALL ROLLS ARE DRIVEN

For Small Diameters

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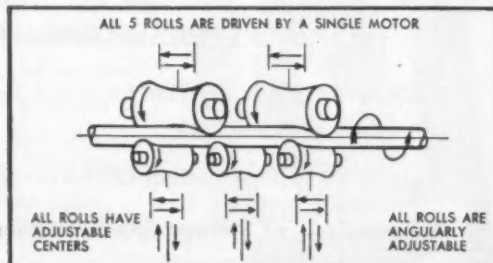
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For accurate straightening of tubes and bars in steel, stainless, aluminum, brass, inconel and other modern metals. Syncro-Drive automatically centers material in pass line without use of guides. Each size machine handles a wide range of sizes for extreme flexibility.

EXCLUSIVE Syncro-Drive (Patent Pending)

Roll speeds are coordinated automatically by the new Syncro-Drive for better straightening and longer roll life.

Set Up and Size Changes
are fast and easy



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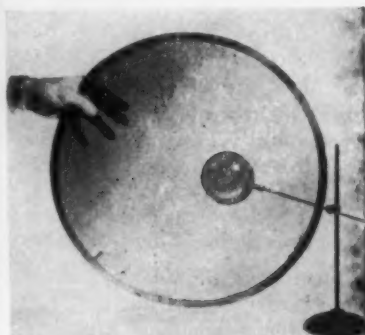
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TECHNICAL BRIEFS

Inspection:

**Aperture masks must have
400,000 perfect holes.**

Aperture masks for color television applications consist of a paper-thin metal sheet into which are etched 400,000 perfect holes. Also known as a shadow mask, they offer some inspection problems for Superior Tube Co., Norristown, Pa. The company has just begun production of the masks under a license from Buckbee Mears Co., St. Paul, Minn.



**Magnifying glass shows some of
400,000 perfect holes.**

Each hole in the aperture mask is 0.01 in. in diameter. It must pass rigid specifications calling for uniform hole size, uniform location of hole, surface condition and absence of mechanical damage.

The mask focuses the television tube's three electron beams on the correct phosphor dot (red, blue or green) on the color screen. To make sure that the right beam hits the right dot, the holes are made to precise size, shape and location.

Heat Treating:

**New temper process
cuts forgings stresses**

Production of aluminum alloy hand forgings with a long sought, low level of internal stresses is being carried out by Aluminum Company of America. The development, made possible by a new tempering process, offers immediate advantages of sharply reduced

machining and straightening time. Internal stresses in finished parts are reduced to a previously unobtainable low point.

Applied To Alloy X7079

Designated T65 temper, the newly perfected treatment has been applied extensively by Alcoa to hand forgings and rolled rings in alloy X7079. Tests and measurements indicate that internal stresses are substantially reduced, and warpage from machining is cut in contrast to the commonly used temper.

A machined hand forging in alloy X7079-T65 shows approximately the same low warpage found in stretched plate and extrusions. Little, and even zero warpage, has resulted in many forgings machined to extremely unbalanced proportions.

Several Years Development

Alcoa's new process is based on precisely controlled cold reduction, following solution heat treatment. The company first produced a hand forging in the temper several years ago, but only limited applications were attempted pending study of the method's effect on mechanical properties. A large accumulation of data now confirms that the former and new tempers' mechanical properties essentially are the same in alloy X7079. Alcoa now offers the new alloy hand forgings and rolled rings in sizes up to 6-in. thick and 72 sq in. in cross section.

Atomic Energy:

Five miles of plastic tape line reactor

Five miles of plastic tape laden with enriched uranium will be used in experiments to help determine the reactor design of nuclear power plants being constructed.

Enriched uranium-235 will fuel an experimental reactor now being assembled by the Babcock & Wilcox Co. in its Lynchburg, Va., critical experiment laboratory.

Fuel elements for the test re-

from tea strainers...



to catalytic crackers...

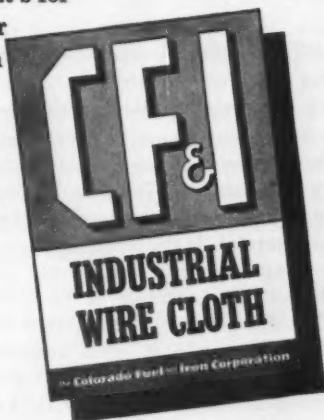
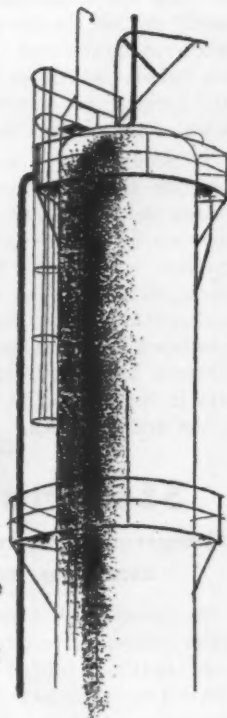
you will find



INDUSTRIAL WIRE CLOTH

It's a versatile product, this CF&I Industrial Wire Cloth. For it plays an essential part in the tiny tea strainer and in the oil refinery's huge catalytic cracker. Chances are that you're using it—or could be using it—to good advantage right in your own operations.

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3675

TECHNICAL BRIEFS

actor will contain the uranium-diffused plastic tape, sandwiched between thorium "converter" plates. This is believed to be the first time that thorium has been utilized in a reactor.

In addition to providing a dispersal medium for uranium oxide, the tape will constitute an added safety device: in the event of an excessive power rise in the core, gas bubbles will form in the plastic, forcing an automatic shut-down of the nuclear reaction.

To produce the large amount of uranium tape the experiment requires, scientists and technicians have set up special extrusion production machinery. The equipment, located in the critical experiment building, disperses the powdered uranium in the polyethylene tape, clads it with pure plastic tape, cools it, and cuts it to the desired width.

Steelmaking:

Temperature recorder guides continuous steel casting

To check highly critical slab or billet temperatures during continuous casting, radiation pyrometers act as "seeing-eyes" for plant operators at Atlas Steels Ltd., Welland, Ontario. The instruments rapidly record surface temperatures on all four sides of the moving slab or billet. These records give the operator a continuous check on uniformity and casting completeness during the run.

The continuous casting machine, designed and constructed by Koppers Co., Inc., made news over two years ago as the first commercial installation for steel casting on this continent. Although its principle is basically simple, successful production for various grades of steel requires precise control and close synchronization of: (1) molten and solid metal temperatures, (2) molten metal levels, (3) machine speed, and (4) cooling water temperatures and flow rates.

In the face of these operating variables, engineers had to "house

break" their machine to produce quality grades of high-speed, tool, stainless, and special alloy steels. Each requires different operating conditions. Automatic recorders were used to guide the initial test runs. These furnished valuable chart records of the key variables. For production runs, operators depend almost entirely upon recorders and controls for successful operation. Yet, instrumentation represents only about one pct of total equipment costs.

Recorders Mounted Centrally

The instrumentation was originally furnished by Leeds and Northrup. Brown controls were added later for ladle tilting and level measurement of molten steel in the mold. Starting with molten metal in the ladle, as received from the melting furnace, basic instrumentation provides for: (1) measurement of molten metal temperatures in ladle, tundish, and mold, (2) control of ladle tilt from weight of molten metal in tundish, (3) regulation of machine speed to maintain constant level in mold, (4) measurement of cooling water and spray inlet and outlet temper-



Observer reads recorders in panel board on operating floor.

atures, as well as cooling water flow rate, (5) measurement of cast slab or billet surface temperature, and (6) measurement of machine speed.

A variable condition at the start is that temperature in the ladle varies, according to the grade, be-

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Atlanta	WLWA	11
Baltimore	WAAM	13
Bloomington, Ill.	WBLN-TV	15
Buffalo	WGR-TV	2
Burlington	WCAX-TV	3
Cedar Rapids	KCRG-TV	9
Chicago	WBKB	7
Cincinnati	WCPO-TV	9
Cleveland	WEWS	5
Columbus, O.	WTVN-TV	6
Dallas-Ft. Worth	WBAP-TV	5
Danville, Ill.	WDAN-TV	24
Denver	KBTU	9
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Houston	KTRK-TV	13
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South Bend	WSJV	52
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Tulsa	KTVX	8
Washington, D. C.	WMAL-TV	7
Wichita	KAKE-TV	10
Wilkes-Barre	WILK-TV	34

9:00-10:30 PM, SUNDAY, LOCAL TIME

Albuquerque	KOAT-TV	7
Bakersfield	KBAK-TV	29
Fresno	KJEO-TV	47
Los Angeles	KABC-TV	7
Portland, Ore.	KLOR	12
Sacramento	KCCC-TV	40
San Diego	XETV	6
San Francisco	KGO-TV	7
Seattle	KING-TV	5
Spokane	KREM-TV	2

2:30-4:00 PM, SUNDAY, LOCAL TIME

Boston	WBZ-TV	4
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4:00-5:30 PM, SUNDAY, LOCAL TIME

Louisville	WHAS-TV	11
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9:30-11:00 PM, SUNDAY, LOCAL TIME

Pensacola	WEAR-TV	3
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*See opposite page
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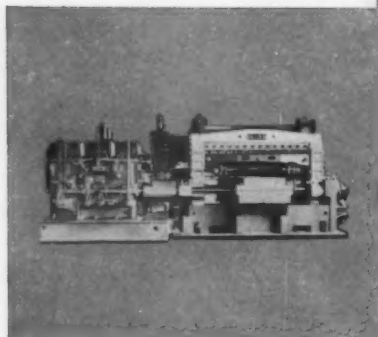
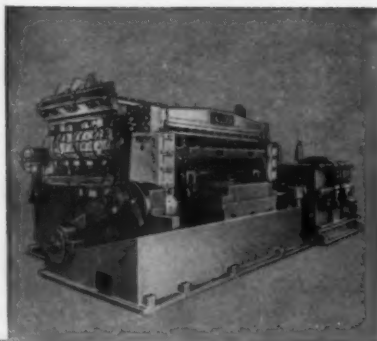
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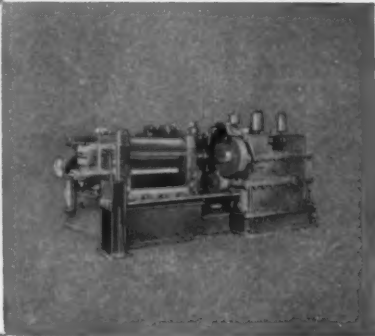
October 18, 1956

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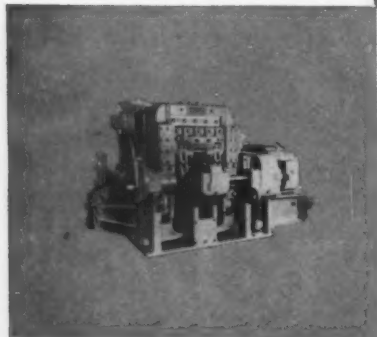
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TECHNICAL BRIEFS

tween 2750 and 2850°F. It is maintained near the desired value by a high-velocity burner. When the ladle arrives at the machine, the operator checks this temperature with a standard L&N immersion thermocouple unit. This is connected to a panel-mounted recorder. A signal light system allows proper measurement. It also tells when the measurement is complete. He then marks the heat number on the chart opposite the temperature record.

The operator uses this same immersion couple to check temperature in the tundish into which the ladle pours the molten metal. He also uses it occasionally to check the metal temperature in the mold.

Control of Ladle Tilt

Although not used at present in normal operation, a Baldwin load cell mounted under the tundish measures molten metal weight in the mold. In effect, it can measure metal level in this reservoir. Based upon this weight measurement, an automatic controller can adjust the ladle tilt through an electric motor. When used, this control functions to hold a constant head of molten steel in the tundish in the face of varying machine speeds. At present, operators manually control the ladle tilt based on visual observation of the molten metal level in the tundish.

Coating:

**Tin plate process
eliminates slag**

Somers Brass Co., Inc., Waterbury, Conn., is making use of a special hot tin plate process. This method provides plate with a smooth surface, solderability, adherence and complete absence of slag. It is expected to find extensive uses by manufacturers of printed circuits, capacitors, and cable wrappings. Tin coatings of 0.00002 to 0.00008 in. and 0.0002 to 0.0003 in. are being produced on brass, copper, bronze and other thin strip metals in gauges from 0.012 down to 0.002 in. widths from 1/8 to 6 in. and wider.

Fastenings:

Construction men run bolts at double riveters' speed.

Two 3-man bolting gangs, each equipped with an automatic air operated torque tool, have run approximately 40,000 high tensile steel $\frac{7}{8}$ -in. bolts in 40 working days on a power plant construction project. Although the crews are half the size of the normal six man riveting gang, the production rate is double the riveters' speed.

Allen Plant, rising on the bank of the Catawba River near Belmont, N. C., is one of the largest construction projects underway in the South. The initial section, now being built by the Duke Power Co. at a cost of more than \$41,000,000, will house two 175,000-kw generating units. It is being handled by the power company's own construction division.

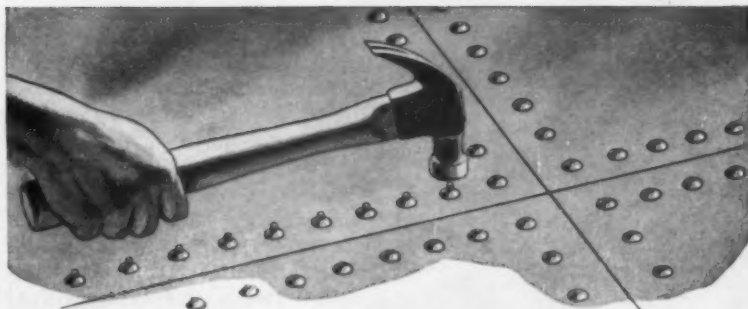
Most Are $\frac{7}{8}$ -in. Bolts

The 40,000 bolts in place represent nearly a third of the 130,000 that will be required for the first section of the plant. Except for about 800 1-in. bolts, all are $\frac{7}{8}$ -in. high strength bolts installed with hardened washers and hexagonal nuts. All the $\frac{7}{8}$ -in. bolts are run with a new size Ingersoll-Rand



Crew tightens bolts in beam at speeds up to ten a minute.

torque control impact tool. These air impact wrenches can be set to deliver any desired torque up to 550 ft lb. They shut off automatically when they reach the preset torque.



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with a hammer!*

★STAR PIN·GRIP DRIVE RIVETS

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The Pin·Grip fastening method requires no special tools or skills and eliminates the use of costly, time consuming nuts, bolts or solid rivets.

Simply insert Pin·Grip into pre-drilled hole and drive the knurled pin flush with the rivet head with an ordinary hammer. Pin·Grip "pulls together" and locks materials into a permanent bond. Absorbs tensions, shocks, jars and vibrations.

Use Pin·Grip for every fastening application — metal to metal, metal to wood and compressible materials between panels. Just a few of the hundreds of uses for Pin·Grip are illustrated on the right. Available in a wide range of sizes in Universal, Countersunk and Full Brazier heads.

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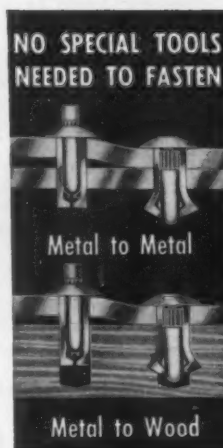


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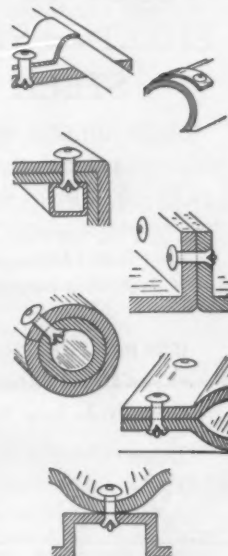
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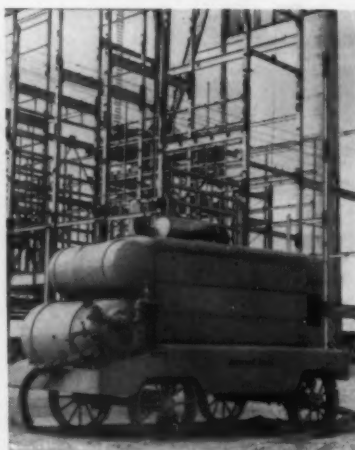
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At Allen Plant, tools are set to a bolt tension in excess of 37,000 lb, the minimum suggested by the Research Council on Riveted and Bolted Structural Joints for the calibration of wrenches. Two wrenches are checked each morning before starting work by running three or four bolts on a Skidmore-Wilhelm hydraulic calibrator which gives a direct reading on bolt tension.

This procedure is followed not just as a check on the tools but to also determine whether any change in the bolts, nuts or washers being used necessitates a



This compressor supplies air to operate the bolt tighteners.

change in wrench torque to achieve the desired tension. It has not been necessary to alter the tool torque setting more than once a week. When a change is required, it is done in a few seconds on a simple jig by altering the twist in the torsion bar.

Checks Standard Tools

Standard size tools used to run the 1-in. bolts also are checked on the calibrator. In this case the operator runs a group of bolts and times the impacting needed to get required tension. Then he seeks to duplicate this timing on each bolt he runs on the job. With the torque control tool, he just puts the tool on the nut and runs it till the wrench shuts off automatically.

When possible, erectors are given the right length high ten-

sile bolts to use in fitting up the steel. These are left in as part of the permanent installation. The bolting gang of two operators and a helper follow and install the remaining high strength bolts, putting the wrench on the fitting up bolts also to bring them to required tension. If the proper high strength bolts are not available, the bolting crew removes the fitting up bolts and replaces them with high strength bolts.

Run 200 Bolts In 20 Minutes

Working up in the air, with scaffolding to hang and move frequently, the three man team with its single impact tool averaged better than 400 bolts a day. When the gang worked on the mezzanine floor, with no scaffolding to bother with, the men could run 40 bolts on a beam and move right on to the next one. Under these conditions, on a time trial, one crew put in 200 bolts in 20 minutes, an average of ten a minute.

Machining:

**Standard units give user
low-cost special machines**

Of particular importance to industry is the availability of standard machine units which can be quickly and economically combined with fixtures to provide special machine set-ups.

One manufacturer, Presto Line Corp., Los Angeles, uses three types of easily obtained automatic drilling units, all from the same source. These are combined into a special machine set-up. On it, zinc die castings are recessed, tapped and drilled in one continuous operation handled by one man. Up to 300 pieces flow through this set-up with no scrap losses and with tolerances held well within the specifications.

Units Drill and Tap

The set-up consists of two automatic drill units mounted on a work table with simple nose brackets. One is on the right front corner and the other located diagonally opposite. These recess both ends of the castings with tool at-

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THE RECORD: Our Portsmouth ACSR Core Wire customers are among the top aluminum cable manufacturers. We ship them millions of pounds of this product in a year's time. Here's the record:

For the first eight months of 1956—January 1 through August 31—out of every 100,000 pounds shipped, 99,592 pounds on the average met all customer acceptance tests.

JOB-PERFORMANCE SCORE—99.59%

For 1955 (full year) the job-performance score of DSC ACSR Core Wire averaged 99.47%.

- (1) Aluminum Cable Strand Reinforcement
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Cold Rolled Carbon Steel Strip
Flat Cold Rolled Carbon Spring Steel

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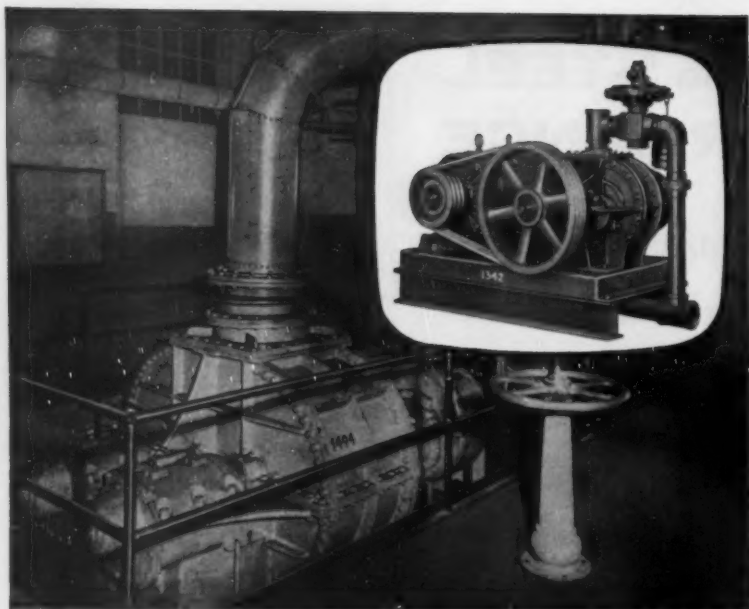
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TECHNICAL BRIEFS

tachments at the same time. On the other two corners, also diagonally opposed, are two drill and tap units. These tap both ends of the castings simultaneously, after they are indexed from recessing position.

A cam operated by a small electric motor controls the operation of both units. The operator then places the workpiece on the fixture above, consisting of six automatic drill heads. These drill six 3/32 in. holes in each piece simultaneously.

Relatively Free Operation

While the table set-up is recessing and tapping pieces, the upper set-up of six drill heads, drills the six holes required. One operator easily handles the workpiece twice, but in what is practically one continuous operation.

Finishing:

Oven saves 98 pct paint drying time

Ten minutes after being sprayed, Allis-Chalmers Lift Trucks and Tractors are ready for delivery, thoroughly dried by infrared heat in a new automatic radiant oven. Air drying the painted trucks formerly took from 8 to 48 hours at the company's Harvey, Ill., plant, often causing a slow-down in the finishing department.

Their new radiant oven, manufactured by Fostoria Pressed Steel Corp., Fostoria, O., is just 18 ft, 4 in. long, equipped with lamps having a total connected load of 100kw. After spraying, completed trucks minus only the seat, with gas tank full, move through this tunnel oven for a thorough infrared paint drying operation that takes only 10 minutes, automatically timed to the spraying job.

Faster, Uniform Drying

Faster, more uniform drying in the infrared oven has improved production, while maintaining a quality finish. Accurate control of intensive heat is provided by infrared energy directed evenly over entire painted surface.

Coating:

**Improved method produces
abrasive-resistant coat**

A major airframe manufacturer has installed a new, improved process for the protective coating of magnesium.

Developed by Dow Chemical Co., Midland, Mich., the process produces an abrasion-resistant refractory ceramic type coating on all standard alloys as well as unalloyed magnesium. It is applied by electrolytic action using alternating current.

"Advantages of the new anodic coating over that provided by a previously used process are extensive," reports the Ryan Aero-



Setup utilizes magnesium hangers as bath attacks aluminum.

nautical Co., San Diego, Calif. Most outstanding is its salt spray resistance which Ryan says is "100 pct improved." In addition, the new coating is insoluble in water, alkaline solutions and some dilute acids, and it can withstand heating to the melting point of the base metal without decomposition.

Time Savings Realized

Substantial savings in time are reported by the process. The treatment not only requires less application time, but also effectively removes oxides and heavy corrosion products during the anodizing stage. This eliminates pre-pickling in dangerous hydrofluoric acid and abrasive or mechanical cleaning operations. Han-

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Each sidewall of a Gates V-belt is concave (Fig. 1)—a precisely engineered curve that makes V-belts last far longer.

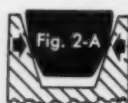
HERE'S WHY: on the bend around the sheave, the concave sides of a Gates V-belt fill out and become straight (Fig. 1-A). Thus the belt makes full contact with the sides of the sheave, grips the sheave evenly. This even contact distributes wear uniformly across the sides of the belt.

Uniform wear lengthens belt life; keeps costs down.

MAKE THIS SIMPLE TEST



Bend a straight-sided belt (Fig. 2). The sides bulge at the bend causing uneven contact in the pulley groove (Fig. 2-A). Naturally, wear is greater at points indicated by arrows. Result: shorter belt life, increased belt costs.



To cut down-time and V-belt replacement costs, specify belts that grip evenly and wear longer. Specify Gates Vulco Rope—the V-belt with concave sides. There is a Gates distributor nearby who will quickly supply the belts you need. The Gates Rubber Co., Denver, Colorado—World's Largest Maker of V-Belts.

There are Gates Engineering Offices and Distributor Stocks in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.



Gates VULCO ROPE Drives

TECHNICAL BRIEFS

ding time is reduced by use of an overhead crane.

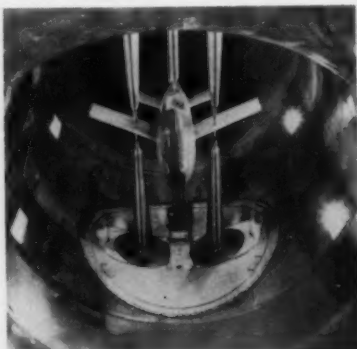
Magnesium is extensively used in the Ryan Firebee jet drone missile and in Ryan-built fuselage assemblies for the Boeing KC-135 jet tanker and its commercial counterpart, the 707.

Magnesium's Biggest Weakpoint

Susceptibility to salt spray corrosion is the greatest shortcoming of uncoated, or bare magnesium. Hence, the necessity for treatments which effectively seal the surface of the metal. This protective coating is especially important on magnesium assemblies installed in Ryan's target drone. This is often immersed in salt water following parachute landing into the sea at the completion of its mission.

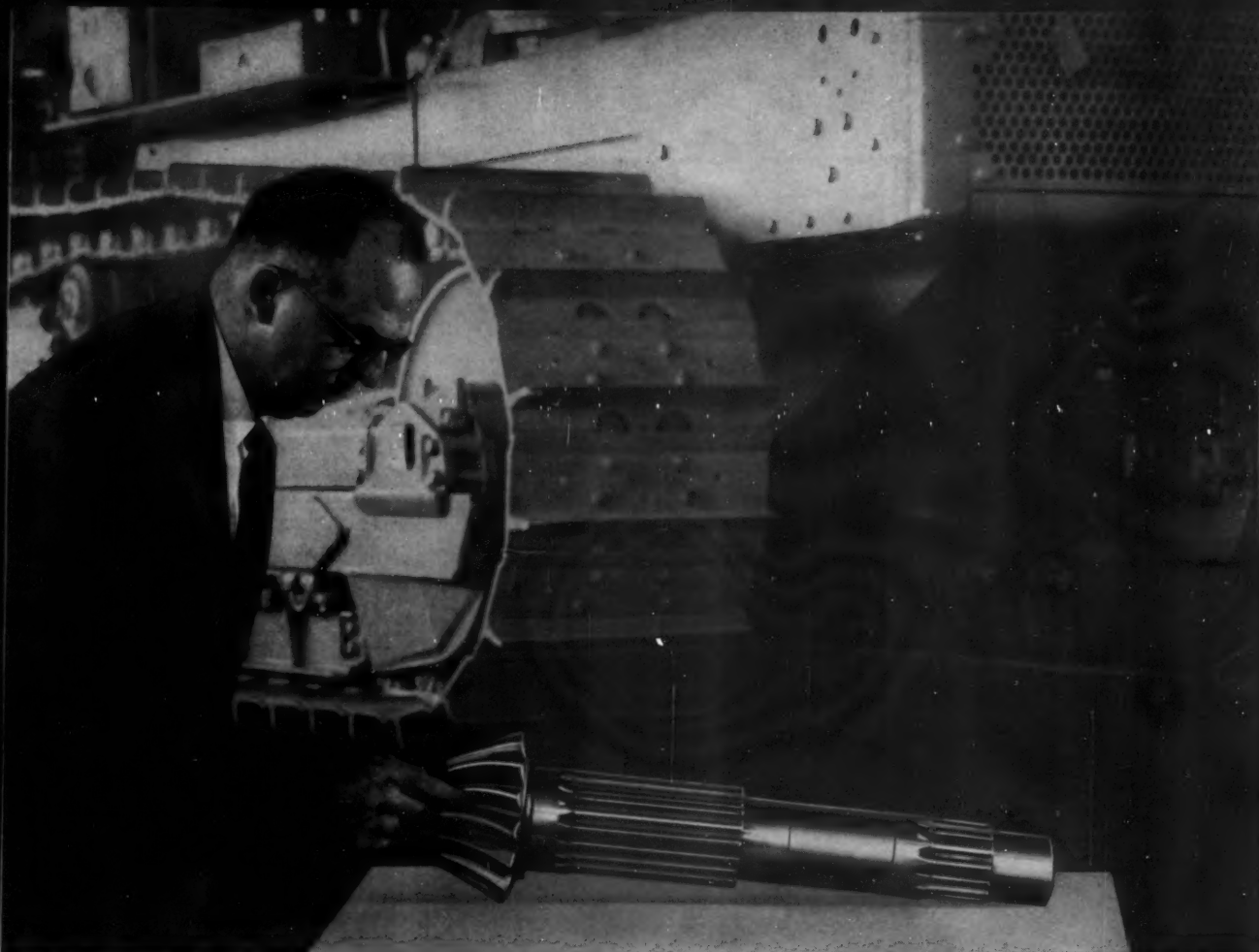
How Anodize Is Applied

Application of the coating works like this: First, magnesium parts are suspended from magnesium hangers which, in turn, are equally distributed along two bus bars, or heavy copper conductors. These carry current to the parts. Parts must be equally balanced on the bars because this is an ac operation; only half the load is anodic at one time. Magnesium hangers are used because the bath attacks aluminum; steel draws too much current.



Wind tunnel model jet drone uses much coated magnesium.

Next, an overhead crane lowers parts into a tank of heavy duty alkaline, steel-type cleaner for ten minutes. The heavy oil film ap-



Caterpillar Tractor Co. Metallurgist T. H. Spencer inspects final drive pinion for D9 crawler tractor weighing 28 tons. Severe loading of this large pinion requires a steel with high case and core hardenability. Several years ago

Caterpillar Tractor Co. found that simply by increasing the molybdenum content of AISI 8622 (to 0.30-0.40%), the desired properties were obtained at lower cost than was possible in any of the standard carburizing grades.

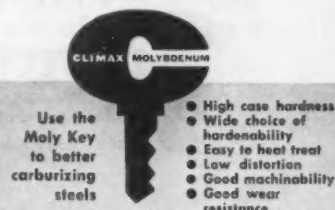
Caterpillar Tractor Co. improves case and core hardenability of carburizing steel by increasing molybdenum content

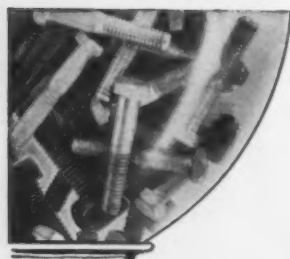
"Drive pinions in tractors must take very high torque loads," says T. H. Spencer, Metallurgist for Caterpillar Tractor Co. "AISI 8622 steel, which we had been using, couldn't give us the hard case and strong, tough core we needed in these heavy sections. Other standard carburizing steels with the requisite properties would have cost substantially more. We found, however, that we could achieve the desired surface and core properties by simply modifying AISI 8622 with a higher percentage of molybdenum. We have been using this composition for several years, and results have been excellent."

Caterpillar Tractor Co.'s experience shows how increasing molybdenum in a carburizing steel helped to solve a specific problem. Perhaps your product, too, can benefit by higher molybdenum content.

A technical article, "New Carburizing Steels for Critical Gearing", describes some recent investigations of higher-moly carburizing steels. For a reprint, write Climax Molybdenum Company, Dept. 2, 500 Fifth Avenue, New York 36, N. Y.

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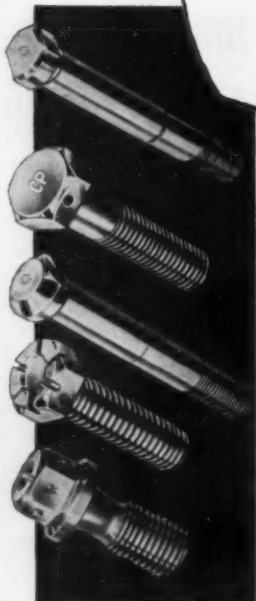
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TECHNICAL BRIEFS

plied by the manufacturer for corrosion protection is removed at this time. This is followed by a five-minute rinse in warm running water. Rinsing is important because the sodium hydroxide contained in the cleaner will contaminate the bath, reducing its conductivity.

The parts are immersed in the tank containing the anodize solution. Current regulator and voltage selector are then set for desired values. The bus bars rest on four saddles, or contact points, mounted on the ends of the tank. These transmit current through the bus bars, down the hangers and into the magnesium parts.

Anodizing Takes Less Time

Anodizing requires an average of five minutes tank time as opposed to thirty minutes required by the previous process. After leaving the bath, parts are rinsed in cold running water for five minutes, then oven dried or blown dry with compressed air. From start to finish, the entire process is completed in 30 minutes, less than half the time required by the former setup.

The protective coating is approximately 0.0002 in. thick and varies in appearance depending on the alloy.

Welding:

**Cash award offered
for stud welding ideas**

A \$1500 cash award will be presented annually for an outstanding contribution to the electric arc stud welding industry.

The cash award, or \$2,000 in scholarships for any individual or school of the winner's choice, will be presented by Gregory Industries, Inc., Lorain, Ohio. It will be given to "the person responsible for the development of stud welding applications or studs which shall be judged most significant on the basis of: (1) reducing costs for industry, (2) improving the appearance, serviceability and life of a product or

structure, or (3) performing a function not possible by any other method."

In addition, the engineering school or college whose students and faculty submit the most outstanding group of entries will be presented with a complete stud welding unit valued at approximately \$1500.

Finishing:

**Machine burr-blasts
up to 350 parts per hour**

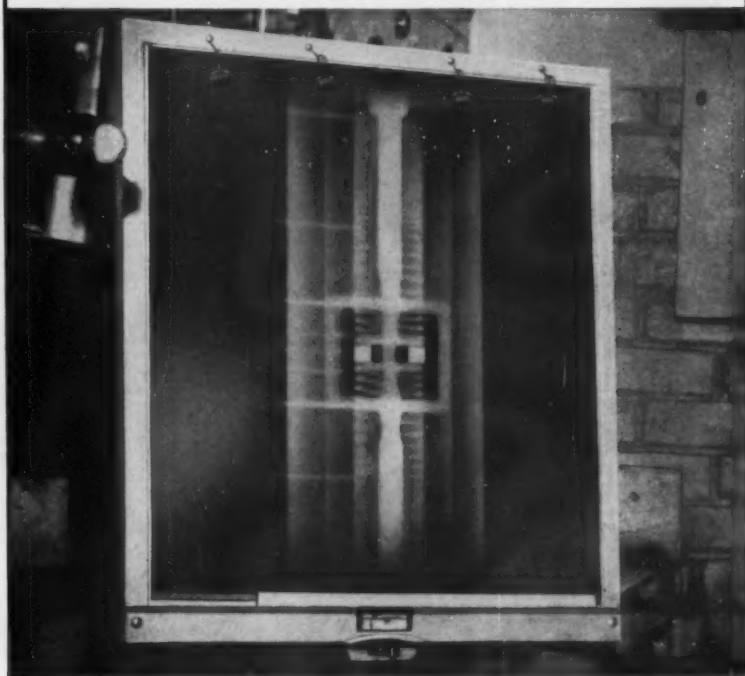
Continuous deburring of finish machined cast iron or nonferrous parts at rates ranging from 250 to 350 per hour are attained in production with a new index-type blaster for in-line installations. Actual production rate depends on both the nature of the part and whether two or four blasting guns are used in the machine. It is designed for removal of "fragmentary" burrs, all those not caused by upsetting of metal.



Two or four blasting guns use walnut shells, peach pits, etc.

Parts enter at the front of the machine and either roll or slide down a track to the loading station where they are clamped automatically and firmly by a neoprene mandrel mounted on an air cylinder. Next, the work holding fixture is indexed, elevating the workpiece into the blasting cabinet. To insure thorough and uniform removal of all fragmentary burrs,

hell box



**This test bar is burning up . . .
to make your furnace parts last longer**

Above is an actual radiograph of an experimental alloy being subjected to extreme temperature conditions in our research laboratories. We use a battery of creep-testing furnaces to test alloys with varying loads . . . at temperatures ranging from 1200° to 2250° F.

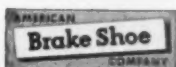
Creep-testing is just one phase of Electro-Alloys Research and Quality Control. Our Elyria plant has a com-

pletely equipped laboratory for metallurgical study of any problem involving high-heat-resistant parts.

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the part is rotated continuously during the blasting operation.

Uses Walnut Shells, Peach Pits

Ground up walnut shells and peach pits, silicon carbide, aluminum oxide, steel shot and grit, etc. can all be used with equal efficiency by the in-line indexing machines. Correct blasting material for a specific job is picked on a dual basis: (1) past experience on similar parts and (2) tests on parts to be blasted.

At the completion of the blasting operation the part holding fixture is again indexed, this time to the unload station. Here the workpiece is stripped from the fixture and slides or rolls down the exit chute for conveying to the succeeding operation.

Either manual or automatic loading and unloading can be used with the blasters. When automatic loading and unloading is used in a completely automatic installation, they are operatorless. They are produced by the Modern Industrial Engineering Co., Detroit, Mich.

Welding:

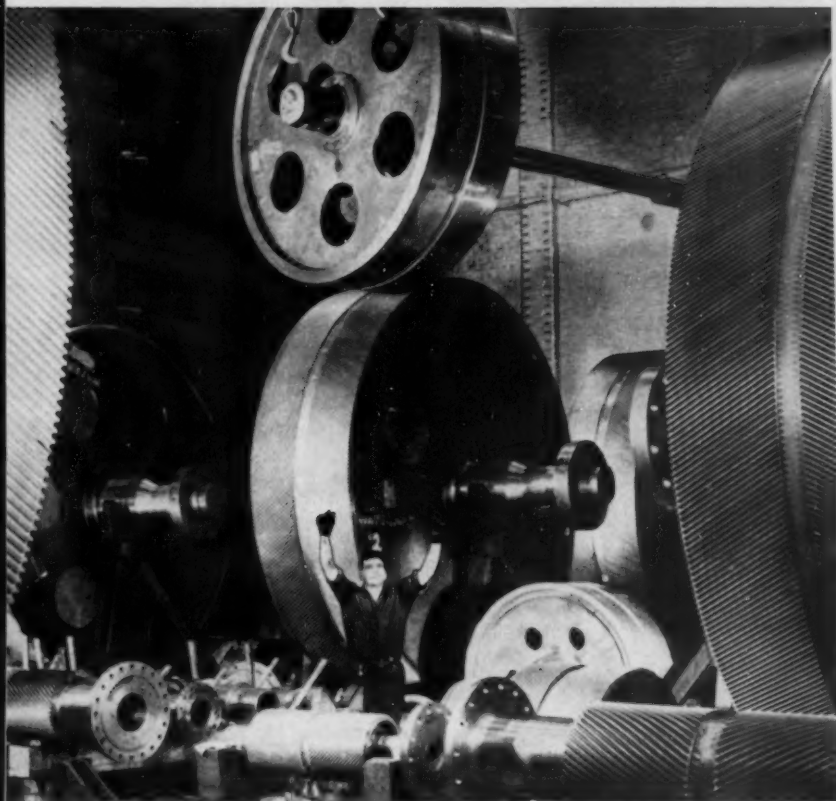
Welded truck prevents LP gas spillage

More and more, welded structures, shapes and tanks are helping win the battle for added safety. This point was graphically illustrated recently when a truck tanker, fully loaded with highly inflammable liquid propane gas and stored under a pressure of 200 psi, crashed into a bridge abutment. Although the undercarriage of the carrier was totally demolished, there were no leaks in the welded steel tank itself nor was a drop of liquid propane lost through other causes.

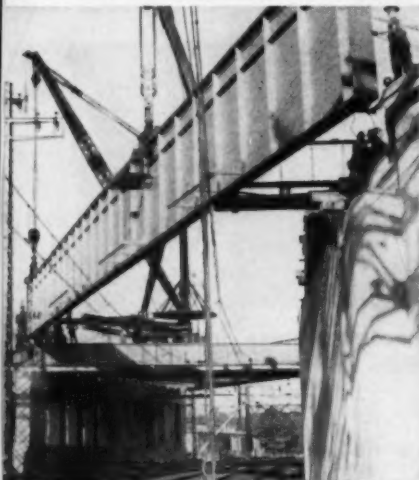
Made From T-1 Steel

This liquid carrier tank was manufactured by the Mosher Steel Co., Houston, Tex., and fabricated from tough T-1 steel, a product of U. S. Steel Corp. In welding the steel plate by the submerged arc

BARIUM STEEL—active in America's growth

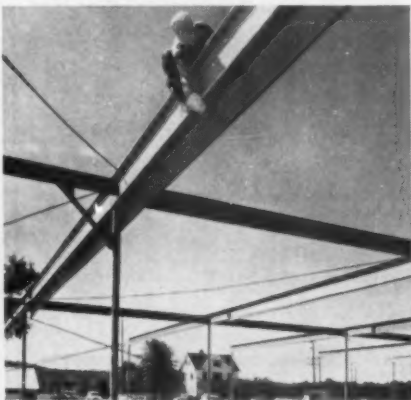


MARINE propulsion gears, an integral part of General Electric ship propulsion units, use steel plate from Barium's Phoenix Iron & Steel Company, Plate Division. These massive web plates are welded to forged steel rims and hubs—the most practical method of construction for large diameter marine gears (up to 16½ feet). In addition to steel plate Phoenix also produces structural steel shapes, heavy wall seamless pipe, and turns out large and small steel fabrications.



HIGHWAY builders timed the installation of this 132-ton, 180-foot-long girder fabricated and erected by Barium's Phoenix Bridge Company at an incredible 27 minutes. This Phoenix-built bridge will carry the New England Thruway over the 4-track main line of the New York, New Haven and Hartford at New Rochelle, New York. Part of the credit for quick work against a tight railroad schedule goes to the Barium-built 100-ton Clyde derrick.

Project of New York State Dept. of Public Works, General Contractors: Arthur A. Johnson Corp., MacLean Grove & Company, Inc.



BUILDING going up here (New Providence, New Jersey) is a new plant for EXCO, Inc. Structural steel comes from Barium's Phoenix Iron & Steel, Structural Division. Elizabeth Iron Company of Elizabeth, N. J. are steel contractors on this job; they find Barium a good company to work with on small as well as large jobs.



Steel producers, fabricators, product manufacturers

For further information on this close knit, alertly managed team of companies—its engineering resources, production facilities or specific products—write for "The Barium Story" to:

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MATERIALS-HANDLING at this East Coast shipyard centers around the Clyde crane above with its 20-ton capacity, 65-foot reach and mobile 70-foot tower. It's only one of many cranes that Barium's Clyde Iron Works has supplied to this customer. If you've got a materials-handling problem coming up, chances are a Clyde crane, hoist or unloader can give you the lift you're looking for.



CONSTRUCTION of New York's 30th Street Helipoint began as this Wiley floating crane with its 110-foot boom slammed the first steel pile down to bedrock. Barium's Wiley Manufacturing Company, the nation's largest manufacturer of floating cranes, built this one for George W. Rogers Construction Corp., contractors for the Port of New York Authority. Wiley also produces work boats and steel barges.



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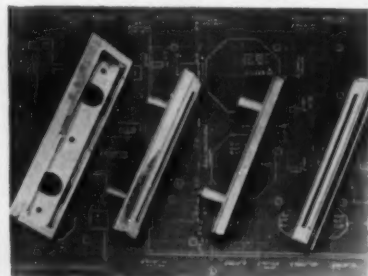
method, Mosher utilized automatic welding wire supplied by Page Steel & Wire Div., American Chain & Cable Co., Inc., Monessen, Pa. The steel has a tensile strength of 105/130,000 psi and an elongation of 15 to 20 pct. It is comparable to and compatible with the 115,000 psi strength and 14 pct elongation of the welding wire.

Before repairing the truck's undercarriage, the tank was sand-blasted clean and thoroughly Magnaflux inspected. No cracks could be found in either the steel plate nor at any of the welds.

Diecasting:

Diecasting eliminates clumsy assembly.

Engineers at a freezer manufacturing firm wanted the answer to a heretofore serious design bottleneck: "how to eliminate the clumsy door handle assembly from refrigerators?" They required a latch assembly that would have a minimum of "pull-travel," lever arms that would not protrude from the door, and a design that would lend itself to a clean, modern door appearance, yet incorporate desirable operational features.



Diecasting these freezer parts offers many advantages.

Early in the planning stages, consultation between engineers of the Amana Co. and a job shop die caster resulted in the solution. A chrome plated zinc die cast escutcheon framing a push-button type latch assembly that could be opened with a light thumb or elbow touch was recommended. The new die cast design permits

operation of the latch with a natural motion. The push button is longer to provide an easier target.

The flexibility of the die casting process permits a finger hold for swinging the door outward. It incorporates a series of parallel cast-in grooves on the underside of the escutcheon for nonslip gripping. Cored holes and cast-in projections assure positive, accurate positioning of the components. Assembly time is reduced. The actual operating part of the push button is a zinc die cast push bar which provides the mechanical strength, and two tapped bosses for attaching the interior linkage for the latch.

Heat Treating:

Higher temperatures improve beryllium-copper strength.

Higher tensile strength and hardness can be obtained in beryllium-copper strip by modifying standard heat treating procedures now employed with the metal.

Four new treatments are recommended by John T. Richards, chief engineer of Penn Precision Products, Inc., Reading, Pa.

Instead of the customary 600°F treatments, he suggests the following age hardening treatments: (1) For soft or solution treated metal (A), heat 3 hours at 650°F; (2) For quarter-hard metal ($\frac{1}{4}$ H), heat 3 hours at 625°F; (3) For half-hard metal ($\frac{1}{2}$ H), heat 2 hours at 625°F, and (4) For hard metal (H), heat 2 hours at 625°F.

Produce Maximum Hardness

These treatments are said to produce approximately maximum hardness in beryllium-copper containing 1.60 to 2.00 per cent beryllium. Gradual changes in the composition of the alloy made the modifications necessary.

The recommended new treatments were introduced as the result of research by the company into processing and fabrication of beryllium-copper strip.

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Normalizing?
Nitriding?
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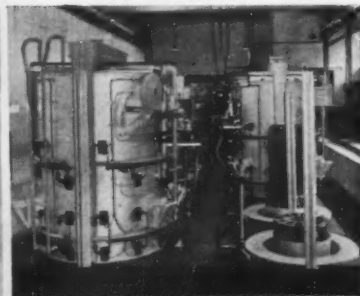
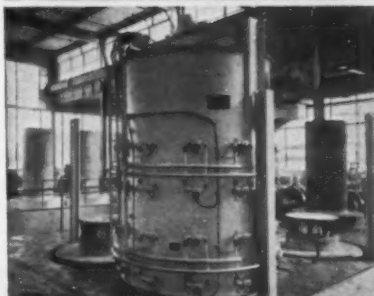
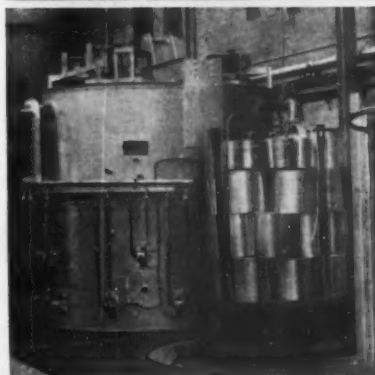
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Whether you design the product or design the steel, Foote ELECTROMANGANESE® and NITRELMANG® are ready to serve you. If you want additional information, we'll be happy to help you.



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Fabricating:

**Bridge cables are galvanized
with special zinc.**

A system of 17,900 miles of special zinc coated galvanized wire is used in the giant cables of the new Walt Whitman Bridge spanning the Delaware River at Philadelphia. The thick zinc coating is expected to offer lifetime protection.

Beginning with an estimated traffic load of 15,000,000 automobiles annually, the bridge is expected to be used by 20,000,000 by 1960. All this traffic will be supported by its massive 23 in. diam cables. These are composed of 11,396 galvanized bridge wires each. This bridge wire was fabricated by the American Steel & Wire Div. of United States Steel Corp. at its Trenton, N. J. plant.

Will Support 39,000 Tons

Steel rods were processed into cold drawn wire in a normal operation. Then they were hot galvanized, tested and reeled in 16-ton lots on special spools for "spinning" on the bridge.

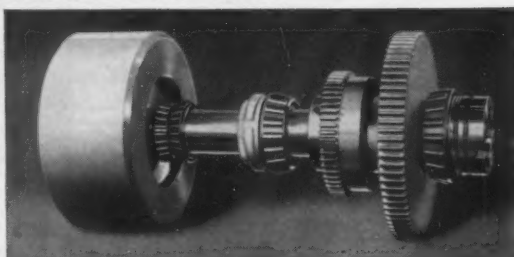
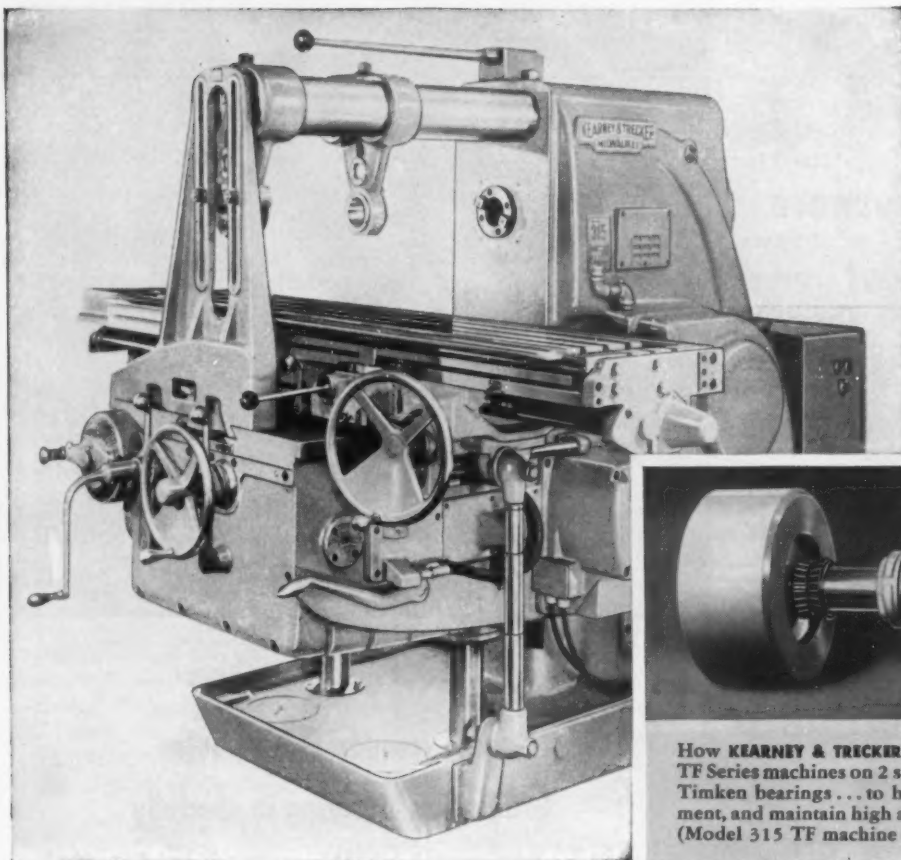
Cables, made of 37 strands of 308 wires each, will support 39,000 tons. They were coated with zinc supplied by the New Jersey Zinc Co.

Materials:

**Plastic-steel repairs miller;
cuts down time by 60 days**

Sixty days down time was eliminated when a large shipbuilding concern located on the northeastern seaboard adopted a new repair method, utilizing a relatively new plastic-steel material to fix a large milling machine. The firm estimated that in addition to the time saving, that it saved over \$5000 cash.

Plastic-steel, a combination of 80 pct steel and 20 pct plastic, was used. Applied and handled much like modeling clay, the material is finding more and more uses for repairing broken machinery and



How KEARNEY & TRECKER mounts the spindle of its TF Series machines on 2 single-row and 1 double-row Timken bearings... to hold spindle in rigid alignment, and maintain high accuracy through 24 speeds. (Model 315 TF machine illustrated).

New milling machine gets constant accuracy through 24 speeds with spindle on TIMKEN® bearings

FROM 15 to 1500 rpm, with 24 speed changes in all, and plenty of capacity for any tool load—that's the new TF Series of twin-screw designed Kearney & Trecker mills. There are 28 Timken® bearings contributing to these machines' built-in stamina and constant high precision. Most importantly, the spindle is mounted on two single-row and one double-row Timken precision bearings which hold it in rigid alignment through all speed and load changes. Chatter is eliminated, and long bearing life with minimum maintenance is assured.

Because of their tapered design,

Timken bearings take radial and thrust loads in any combination. Full line contact between rollers and races imparts extra load-carrying capacity. And of course, with Timken bearings designed to last as long as the machine itself, maintenance costs go down.

Geometrically designed to give true rolling motion, Timken bearings are precision manufactured to live up to their design—produced under rigid inspection and quality control. We even make our own fine alloy steel, something done by no other American bearing manufacturer. When you build or buy equipment, look for the "TIMKEN" trade-mark on every

bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".



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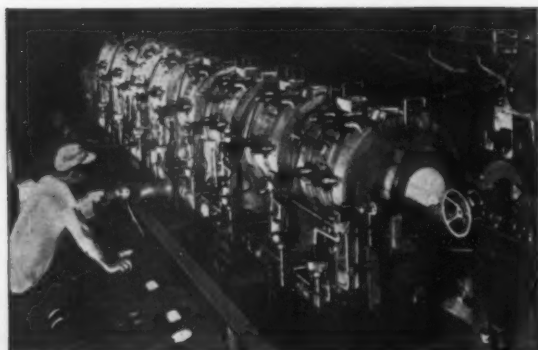
TAPERED ROLLER BEARINGS ROLL THE LOAD

34

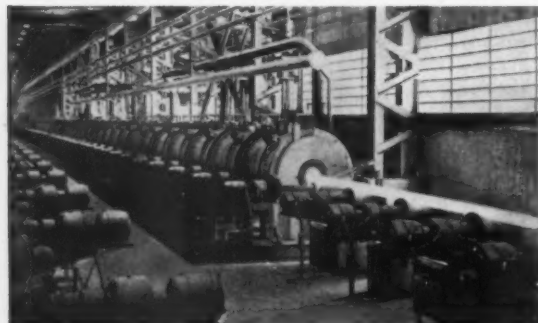
Selas Barrel-Furnace Lines Heat Treat Tubes and Bars . . . in Continuous Operations at Mill Speeds



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Heating for sizing the heaviest wall seamless tubing produced in the U. S., at Phoenix Iron and Steel.



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**19 steel companies use Selas
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Selas barrel-furnace lines throughout the steel industry perform their heating jobs as part of in-line continuous production operations, automatically controlled. The compact, space-saving, gas-fired furnaces deliver uniform heating with speed and precision.

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TECHNICAL BRIEFS

metal parts. Two hours after application to the damaged portion of the miller, one of the world's largest, the mixture became a rigid, steel-like mass. Once hard, it can be sawed, drilled, threaded or ground with ordinary metal-working tools.

The material was originally developed for making tools, jigs, fixtures, molds, dies, etc. It was soon found that it was an excellent adhesive for metals and could be used for bonding steel, iron, bronze, brass, aluminum and lead to themselves, to each other, or to many other materials including glass, porcelain concrete and wood.

Trade-named Devcon by its developers, Devcon Corp., Danvers, Mass., it is now being used for rebuilding broken machinery, filling large and small holes in castings, building up worn metal surfaces on machine tools, repairing stripped threads, bearings, and many similar applications.

Repairs 3000 Ton Press

Chrysler Corp., for example, repaired the cylinder of a 3000 ton hydraulic press with it. The company reported a saving of over \$25,000 and 60 days of lost production time. A paper mill in Canada recently filled the break in the water jacket of a large air compressor and was able to resume production in three hours.

Marriner Combing Co., a large wool top manufacturer, uses it for repairing all types of industrial equipment. Recently, the firm repaired a large centrifuge with one pound of it.

A "Putting On" Tool

Devcon has been described by one machine tool manufacturer as a "putting-on" tool (i.e.: in repairing lathe beds and radial drill columns).

A large power company recently repaired a giant valve with the material. The entire operation took only five minutes. A blowtorch was used to dry and heat the broken valve section. Then plastic-steel was applied; warmed slightly with the flame.



Oakite's FREE Booklet on Metal Cleaning

answers many questions that mean better production, more profit for you. Just look at the table of contents:

Tank cleaning methods

Electrocleaning steel
Electrocleaning nonferrous metals
Pickling, deoxidizing, bright dipping
Applying iron phosphate coatings in preparation for painting
Applying zinc phosphate coatings
Cleaning, removing rust and conditioning for painting in one operation

Machine cleaning methods

Paint stripping
Steam-detergent cleaning
Barrel finishing, burnishing
Better cleaning in hard water areas
Treating wash water in paint spray booths
Rust prevention
Machining and grinding

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Send me a copy of your booklet "Some good things to know about Metal Cleaning"

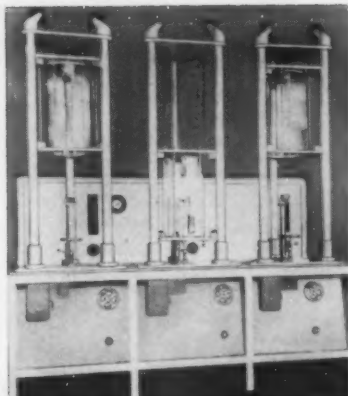
NAME _____

COMPANY _____

ADDRESS _____

NEW EQUIPMENT

New and improved production ideas, equipment, services and methods described here offer production economies... for more data use the free postcard on page 145 or 146.

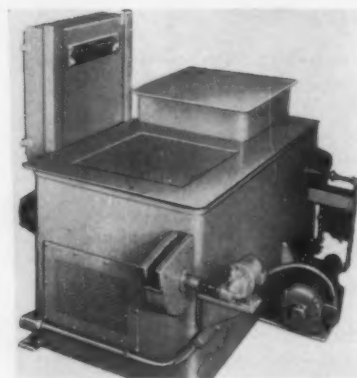


Production fixture brazes assemblies without flux

Induction heating under a controlled atmosphere allows a new production fixture to braze metal assemblies without the use of flux. The joints produced by this unit are uniformly sound and free of residual or entrapped flux. These insure dependable corrosion-resistance and strength in critically stressed inaccessible parts. Such joints are considered highly difficult to achieve with normal brazing techniques. In addition, this process leaves a smooth fillet and elimi-

nates cleaning and fluxing costs. Combining induction heating, which provides rapid localized heating, and a controlled atmosphere, this unit successfully joins copper alloys, steel and stainless steel assemblies on a production basis. One operator can work all three work stations with a single induction heating unit, according to the manufacturer. High frequency current is fed to the work coils through coaxial leads. *Apex Graphic Co.*

For more data circle No. 26 on postcard, p. 145



Washer not limited to gears, or round parts

Smoothed-out operation of automatic production lines is promised with a new, compact gear washer. The unit operates at room temperatures. It is not limited to handling of gears or even round parts. It can be used for any production line cleaning operation where removal of either chips or loose dirt from relatively small parts is important to subsequent machining or inspection operations. Either magnetic chip separators or self-clean-

ing filters are available as optional equipment. Parts may be received by gravity direct from machines on previous operations or parts may be received from a collecting floor conveyor. The size requirement for parts that can be handled ranges from fractions of an inch to about 3-in. diam. The compact gear washer can handle up to 1000 parts per hour. *Gear-O-Mation Div., Michigan Tool Co.*

For more data circle No. 27 on postcard, p. 145



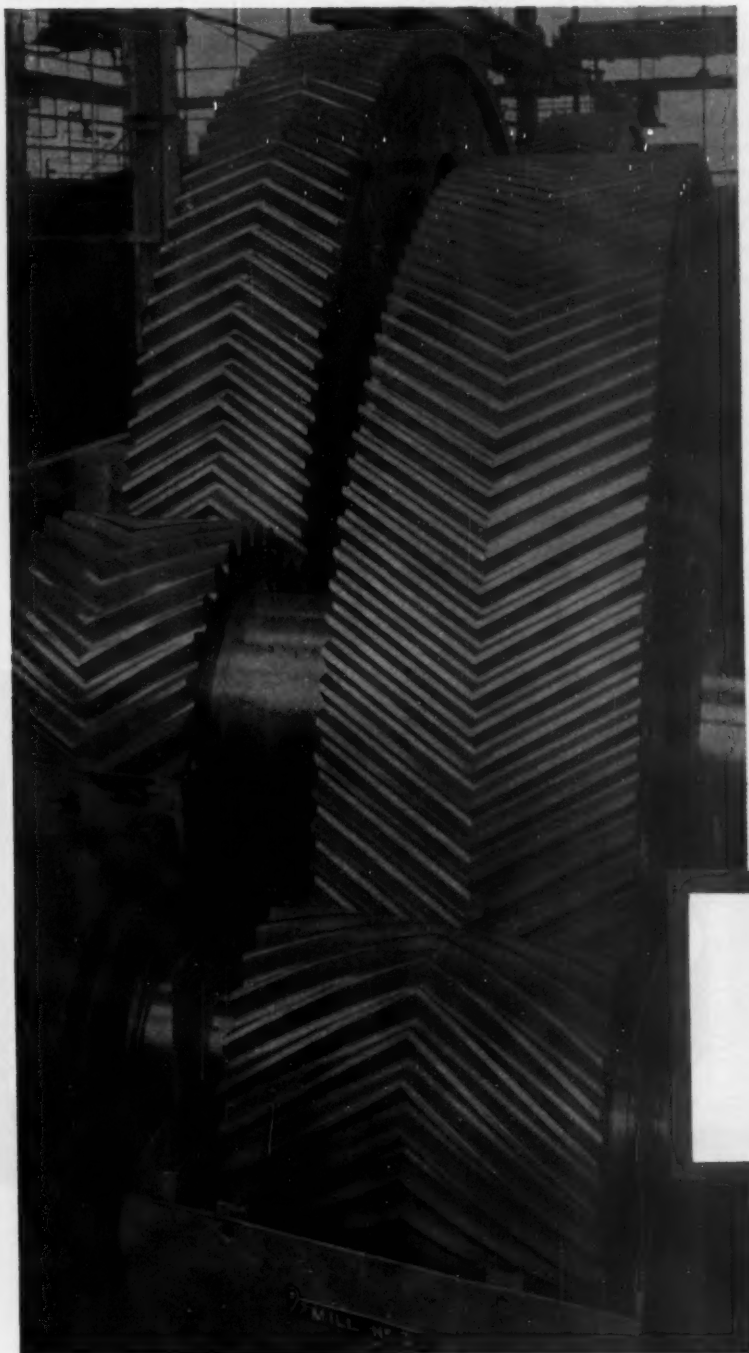
Special press punches printed circuit boards

Redesigned specifically for punching printed circuit boards, a special press employs a pantograph principle accessory. The press reproduces any pattern of holes up to a 15 x 25-in. area from a master template. Holes of any shape from 0.030-in. to 3½-in. diam can be punched cold in most dielectric materials. Superior hole quality, with absence of cracks, halos or bellmouth, is promised by close-fitting guides. These align the punch tip with the die. "Pilot-pin accuracy" is maintained between

template and workpiece since both are located by means of precision ground locator pins. The template is clamped in the positive duplicator when its reference holes are located on the template pins. The workpiece is securely located by its reference holes on the pilot pin workholders. As the duplicator stylus is moved to the hole locations in the template, the pantograph carriage correspondingly positions the workpiece under the fabricator punch holder. *Wales-Strippit Co.*

For more data circle No. 28 on postcard, p. 145

look at the **EXTRA STRENGTH** in these gears



Notice how the teeth are continuous across the face of each gear in the photo? That is a characteristic of Farrel herringbone gears, which, instead of a useless center groove, have a *backbone* where the helices meet. This puts the entire face width of the gear to work for you. It pays off in *extra strength* and greater load and shock capacity — in smaller space.

The answer lies in the unique method of manufacture. The machines that cut Farrel gears—famous Farrel-Sykes generators—make continuous tooth herringbone gears. The center groove required for tool clearance by other machines is replaced by useful working tooth area.

Backbone comes in any size up to 23 feet diameter — for virtually any application. Ask for details.

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONN.

Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.

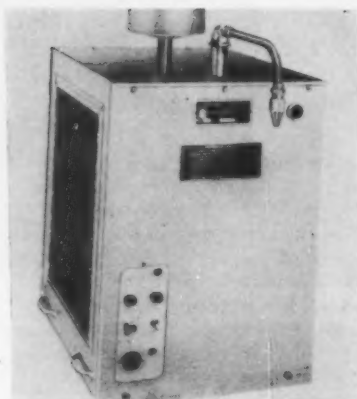
Sales Offices: Ansonia, Buffalo, Boston, Akron, Detroit, Chicago, Minneapolis, Fayetteville (N. C.), Los Angeles, Salt Lake City, Tulsa, Houston

FB-1070



This comparison shows the greater tooth area of the Farrel continuous tooth herringbone gear (left) which gives it greater strength than the double helical gear with center groove (right).

Farrel-Birmingham®

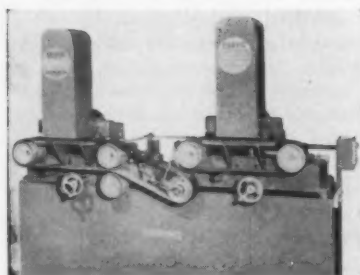


Machine dispenses curing agent and resin

A new dispensing machine for two-part, self-curing flowable resin systems meters the correct proportion of curing agent and resin, mixes them, and discharges a pre-selected amount. The unit is flexible, easily adapted to any production setup, and may be modified to meet requirements in many fields. The maker has been supplying potting and casting compounds during recent years. Various models handle liquid resin such as epoxies and resorcinols and their curing agents

with consistent accuracy and safety. They give adjustable, intermittent uniform shots recommended for the potting of electronic assemblies, bonding various items or sealing items like resistors, phenolic containers and similar components. Ratio of resin to catalyst can be varied, as can volume. Standard 115 v, 60 cycle, ac current is required; no air or water connections are necessary. *H. V. Hardman Co., Inc.*

For more data circle No. 29 on postcard, p. 145



Double side grinder has turn-over transfer unit

Near automation in the grinding, polishing and deburring field, is made available with a new model double side grinder. Incorporating a turn-over transfer unit, between conveyORIZED abrasive belt heads, it will grind, polish or debur both sides of a workpiece in one handling of the stock. The simple

turn-over mechanism allows grinding and polishing of pieces of different sizes and shapes. It can accommodate practically any piece. It uses abrasive belts 4 in. wide x 54 in. long and incorporates a 1½ hp abrasive belt motor. *The Curtis Machine Corp.*

For more data circle No. 30 on postcard, p. 145

NOW... MAY-FRAN...



PERMITS YOU TO ASSEMBLE YOUR OWN...



CUSTOMIZED CONVEYOR...



Whether you give first consideration to cost... or to the overall efficiency of an installation... the MAY-FRAN CONVEYOR STANDARDIZATION PROGRAM provides benefits never before possible.

Through STANDARDIZATION, you now can build your own CUSTOMIZED conveyor to meet your own individual needs. The MAY-FRAN components... mass produced... can be assembled into virtually any type of hinged-steel conveyor for the handling of stampings, formed metal parts, forgings, automotive scrap, chips and turnings.

Straight sections... concave or convex sections... take-up and discharge-end sections can be furnished to meet specific requirements of belt width as well as load bearing and volume capacities.

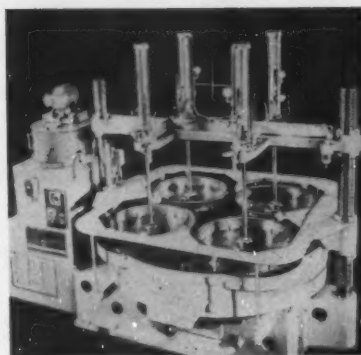
These pre-fabricated units are available rapidly and at low-cost. You save money many ways with MAY-FRAN standardization because... conveyors can be assembled by your own plant personnel... conveyors can be modified in any way when production needs change... conveyors can be dis-assembled and moved to other plant locations.

Lapping machine features new pneumatic lifts

Two newly redesigned and one additional feature are incorporated in this lapping machine. A spider bar and roller bar attachments have been improved. An ammeter has been added as standard equipment. The spider bar is now a two stanchion set-up and is thoroughly ribbed on the underside to withstand all possible pressure the pneumatic cylinder can produce.

This prevents binding from taking place in the guide ways when the pressure plate and conditioning rings are lifted. Two adjustable supports have been added to the roller bar. These keep the roller bar on even plane so that it can be conveniently stacked with parts during loading or unloading of the machine. *Crane Packing Co.*

For more data circle No. 31 on postcard, p. 145

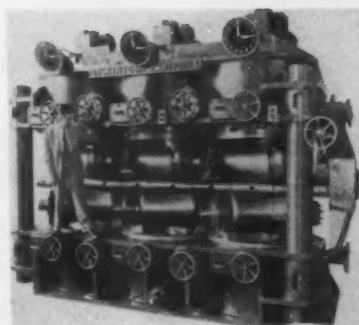


Pipe straightener offers easy maintenance

An improvement in the design of one company's heavy-duty rotary tube straightener makes larger models easier to adjust and maintain under adverse operating conditions. The new design is actually an adaptation of a rigid three-post arrangement of supports between the bed and the top of the machine. Three-post construction has already been widely used on smaller

straighteners up to the model for pipe and tube of maximum 1 in. OD. Larger straighteners previously available only with six threaded posts are now being supplied using the three-post construction. Included is a model for 16 in. electric welded pipe recently shipped to a large eastern steel plant. *Mackintosh-Hemphill Div., E. W. Bliss Co.*

For more data circle No. 32 on postcard, p. 145



FROM STANDARD
COMPONENTS . . .



7065-MF



For complete information,
write today for your copy
of MF-Bulletin 200

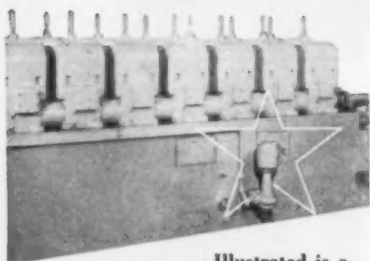


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1698 Clarkstone Road • Cleveland 12, Ohio

Star Performer on METAL WORKING machinery

Ruthman Gusher

Coolant Pumps



Illustrated is a
Yoder Forming Mill—
equipped with a Ruthman
Gusher Coolant Pump.

You get instantaneous coolant flow, from trickle to full volume, the moment the machine starts, with a Gusher Coolant Pump. The electronically balanced shaft reduces wear from vibration to a minimum. The pre-lubricated ball bearings require no maintenance attention. From every angle, Ruthman Gusher Coolant Pumps are better.

THE **RUTHMAN** MACHINERY CO.

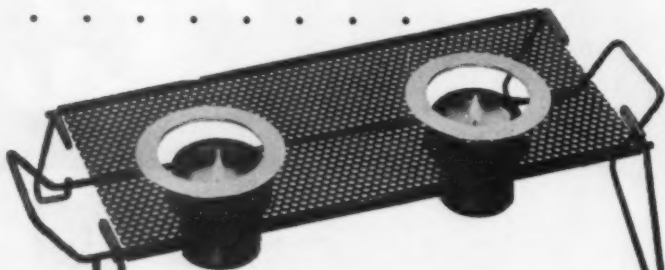


1809-1823 READING RD.

CINCINNATI 2, OHIO

Something new has been added to the "Coffee Klatch"

The Silex Company, noted manufacturers of vacuum coffee-makers, selected Hendrick Perforated Metal to fabricate this popular two-unit coffee-casserole warmer. Hendrick Perforated Metal not only adds to a product's attractiveness but it increases its salability as well. You can select from hundreds of attractive designs in commercially rolled metals and gauges to suit your most exacting requirements. Available with round, square, diamond hexagonal or slotted perforations in plain or panel effects.



Hendrick
MANUFACTURING COMPANY

37 Dundaff Street, Carbondale, Pa. • Sales Offices in Principal Cities
Perforated Metal • Perforated Metal Screens • Wedge-Slot and Hendrick
Wedge Wire Screens • Architectural Grilles • Milco Open Steel
Flooring • Shur-Site Treads • Armorgrids • Hendrick Hydro-Dehazer

NEW EQUIPMENT

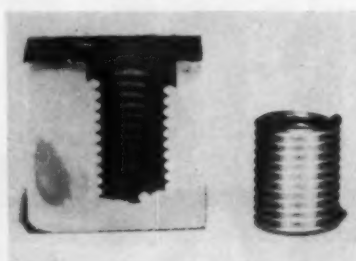
Industrial diesels

Industrial diesel engines that can operate exclusively on low-cost fuel have been developed in ratings to 1025 hp. The new series is available naturally aspirated or supercharged. They are designed for use in heavy equipment like power shovels, as standby power for industrial plants and telephone companies and mobile power for utilities. Portable engine generator sets range to 600 kw capacity. The new heavy-duty models are built as four-cycle, six or eight cylinder, vertical, in-line engines but they provide power equal to other engines with more cylinders. Output of the engines ranges from 215 to 1025 hp. The latter represents nearly a 50 pct increase over a top capacity of 700 hp in the previous line. Yet the new supercharged engines are the same size as the previous model. *White Motor Co.*

For more data circle No. 33 on postcard, p. 145

Wire-thread insert

Durable, corrosion-resistant threads in cast-metal parts are made with a new stainless steel insert for high-speed casting of integral threads. It eliminates expensive drilling and tapping as well as costly moving of heavy castings from casting floor to machine shop. Use of inserts to provide strong permanent threads in aluminum, magnesium, plastics, wood, iron and steel isn't new. Application of this



new wire thread insert, however, provides designers and engineers with a new technique for cost-cutting. Where the standard insert is loosely wound to provide installation flexibility, this new insert is tightly-wound to prevent the flow of hot metal into the female threads. *Heli-Coil Corp.*

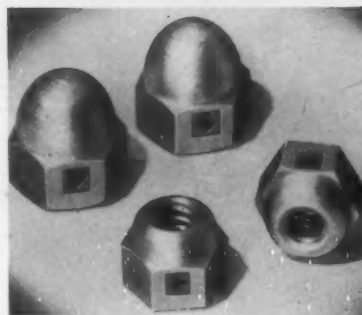
For more data circle No. 34 on postcard, p. 145

Cap nuts speed assembly, reduce inventory

Cap nuts for use primarily on outdoor and indoor steel and aluminum furniture, appliances, plumbing fixtures and in other decorative applications, have a new "thru-tapped" design. This makes it possible to gain a decorative advantage

of a cap nut in applications where it is impossible to seat a regular cap nut. Since the self-locking principle of the cap nut eliminates need for washers, they help speed assembly and reduce inventory requirements. They can be re-used many times without appreciable reduction in torque. *The Nylok Corp.*

For more data circle No. 35 on postcard, p. 145



Safe spectacles

Greater comfort, attractive styling and a high degree of vision are features of new plastic frame, safety spectacles. Square shape lenses provide extensive visibility. Frame



is rugged and lightweight with color added for eye appeal. It is available in copper, cordovan and crystal pink colors, with clear or green lenses in heat treated glass or plastic. *Welsh Mfg. Co.*

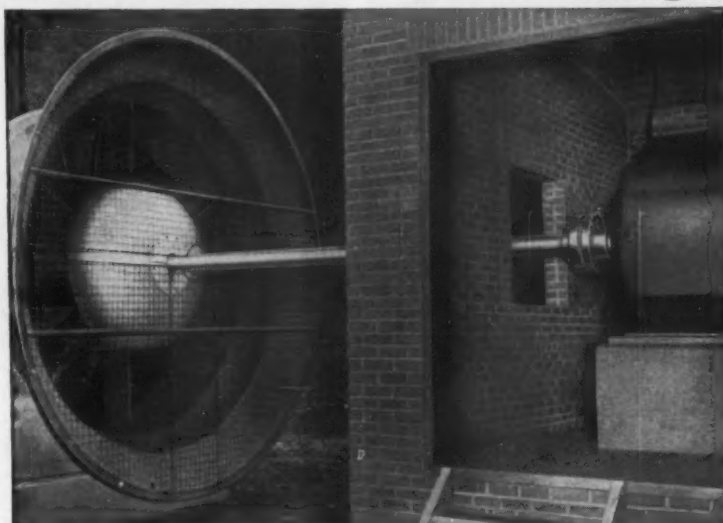
For more data circle No. 36 on postcard, p. 145

Oil resistant label

Pressure-sensitive, oil resistant labels grip with increasing tightness under heat exposure. Designed for rugged application under adverse conditions, this smooth-surface label resists attack from heat, oil, grease, dirt, and many chemicals and acids. Laboratory tests utilizing a blued spring steel surface revealed the oil resistant label passes through two specific adhesion phases when exposed to heat for varying periods of time. The first of these, a primary heat bond, occurred after five hours exposure at 300°F. This was broken only by overnight submersion in aromatic or aliphatic solvent, or by determined scratching with a strong, sharp fingernails. The second, an absolute heat bond, took place after 16 hours exposure at 300°F. A six-day submersion in solvents did not weaken the bond materially, and it was removed only by severe scraping with a sharp instrument. *Avery Adhesive Label Corp.*

For more data circle No. 37 on postcard, p. 145

Eliminate Intermediate Bearings!



By using Thomas Flexible Couplings on long, unsupported shafts, intermediate bearings are eliminated. Thomas engineers tubular shafts free from lateral whip.

The large fan shown above is 16' from the motor to allow sufficient air intake. Miners working underground receive their fresh air supply from this fan and others like it,

which have been giving dependable service for as long as fifteen years... without shutdowns for lubrication or maintenance of the couplings.

Thomas floating shaft flexible couplings are recommended for machine and marine drives, printing presses, paper and cement mills, cooling towers, diesel engines, pumps, compressors, and many other uses.

Only Thomas Flexible Couplings offer all these advantages

UNDER LOAD and MISALIGNMENT

- | | |
|---------------------------------|-----------------------------------|
| 1. Freedom from Backlash— | Constant Rotational Velocity |
| Torsional Rigidity | 4. Visual Inspection in Operation |
| 2. Free End Float | 5. Original Balance for Life |
| 3. Smooth Continuous Drive with | ... and |

**THOMAS ALL METAL COUPLINGS HAVE NO WEARING PARTS
SO LUBRICATION AND MAINTENANCE ARE ELIMINATED**

Write for Engineering Catalog 51A

THOMAS FLEXIBLE COUPLING COMPANY

WARREN, PENNSYLVANIA, U.S.A.

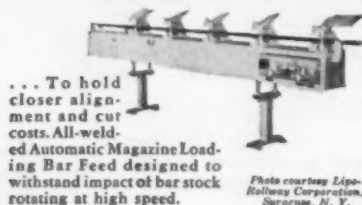
When
product designs
for welded steel

Have twice
the rigidity...
three times the
strength

Yet require
less material
...cost less
to fabricate

WHY
aren't all your
products designed
for welding?

THE WELDED WAY



... To hold
closer align-
ment and cut
costs. All-weld-
ed Automatic Magazine Load-
ing Bar Feed designed to
withstand impact of bar stock
rotating at high speed.

Photo courtesy Lipo-
Railway Corporation,
Syracuse, N. Y.

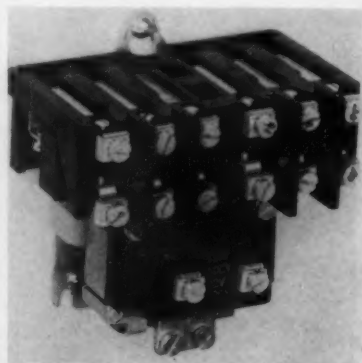
Write
THE LINCOLN ELECTRIC CO.

Dept. 1523, Cleveland 17, Ohio
The World's Largest Manufacturer of
Arc Welding Equipment

NEW EQUIPMENT

Machine tool relay

New six pole in-line 10-amp relays are designed for applications such as machine tools and control panels. They increase flexibility and conserve panel space by cutting down on extra relays. A new saddle-type terminal permits wiring from four directions with either plain wire or crimped-on terminal connections. It is available in both standard and latched-in forms. All terminals of



the new machine tool relay are accessible from the front. The relay's "strongbox" coil helps reduce coil damage due to slipping screwdrivers or failure caused by moisture, oil, or cutting fluids. A rolling motion of the contacts assures complete contact reliability. *General Electric Co.*

For more data circle No. 38 on postcard, p. 145

Multiple machine

Complete machining of air conditioning housings from rough castings to assembly is now accomplished. A new machine produces 18 pieces per hour at 100 pct efficiency, according to the firm. It performs 159 operations: six milling, six boring, one facing, 81 drilling and 65 tapping. Two-position, progressive type, palletized work-holding fixtures carry the parts from station to station. To provide for flexibility in part design changes, replacement and repair, building block construction was used. All parts, even tooling details, are made to interchangeable tolerances for fast and easy maintenance. It has JIC standard hardened ways. *The Cross Co.*

For more data circle No. 39 on postcard, p. 145

Sam Made The PANTS TOO LONG



O.W. Churman

PRESIDENT, THE CINCINNATI GEAR CO.

Some time ago I had a friend who decided (as I guess everyone has at some time) that the best way to get a good suit would be to buy some cloth that he particularly liked and then have the suit "made to measure" by a tailor. The purchase of the cloth presented no problem, but the selection of a tailor was another matter. He finally chose a small, inconspicuous one-man shop someone suggested to him; the poor fellow who ran it looked half starved, so he assumed he was about to get a real bargain.

After a reasonable wait, he got the suit; but it was a *terrible* fit. He went back for "alterations." It still fit poorly, but he didn't have the heart to go back again to the old man and tell him the truth—that his suit was no good. So, he gave the suit to his yard man.

The moral of this is clear—unless you're a gambler by nature, take your business to a shop that is big enough to do the job right in the first place, or to *make good* if it turns out wrong. This moral holds true whether you're buying suits or custom gears. Our reputation of nearly 50 years of virtually invariable customer satisfaction shows that we are equipped to do the job right—and if, by some chance, there *is* something wrong, we correct it to your complete satisfaction—almost quicker than you can say "Sam, you made the pants too long!"

THE CINCINNATI GEAR CO.

CINCINNATI 27, OHIO

"Gears—Good Gears Only"



No-bounce hammers

The line of one maker's no-bounce hammers has been expanded to include additional sizes of soft and metal-faced hammers and tappers used in production and assembly, sheet metal work, machine shops and construction. The exclusive feature of the hammer is a tubular head loaded with steel grit. This causes the hammer to "follow through" the stroke instead of bouncing. Accident rate is reduced. The operator finds the hammer easier to control and less tiring.



Oscilloscope tests indicate this hammer accomplishes 30 pct more work than a conventional hammer wielded with the same muscular effort. The material worked on is less likely to move, and any secondary tool such as a punch, chisel or stamp stays in position for the next stroke. The soft-faced hammers range in size from 6 oz to 3 lb, with choice of tenite or nylon tips. Metal-faced hammers range in size from 10 oz to 3 lb. *Tahlen Hammer Co.*

For more data circle No. 40 on postcard, p. 145

Steel standards

A set of eight low-alloy steels of the British Bureau of Analysed Samples has been specially prepared for X-ray spectrochemical analysis. The standards are mounted in methacrylate discs 1 in. in diam by $\frac{3}{8}$ in. thick. Containing certified concentrations of eleven elements in nicely graded steps, the standards are particularly valuable for the determination of Cr 0.2-3.1 pct, Ni 0.05-5.1 pct, Mn 0.17-1.5 pct, V 0.12-0.67 pct, Mo 0.19-1.4 pct, and Cu 0.1-0.46 pct. *Spex Industries, Inc.*

For more data circle No. 41 on postcard, p. 145

WARD STEEL CO.

PROMPT WAREHOUSE
SERVICE ONLY

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America of

BLUE TEMPERED SPRING STEEL

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carry a stock which permits satisfying
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DIVISION

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SAVE!

WITH A HANNIFIN AIR PRESS

It's the ideal press for that occasional pressing job. These presses operate off ordinary shop air supply. They're fast and safe. Over 30 models to choose from...many for either bench or floor mounting. Capacities from $\frac{1}{2}$ to 18 tons. Daylight to 46 inches...reach to 12 inches. Prompt delivery.

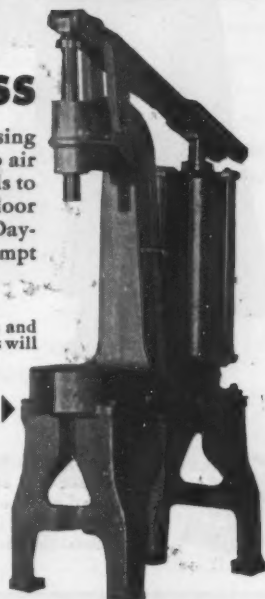


WRITE. Complete information and prices on Hannifin Air Presses will be sent on request.

6 Tons (Model B-2).
One of more than 30
models. Press with
base, \$519.

1-Ton Hand-D-Press.
For small parts manu-
facturers. Press only,
without valves, \$232.

Prices F.O.B. our press plant, St. Marys,
Ohio, subject to change without notice.



HANNIFIN

HANNIFIN CORPORATION, 513 S. WOLF ROAD, DES PLAINES, ILLINOIS



Compression tester graphically records data

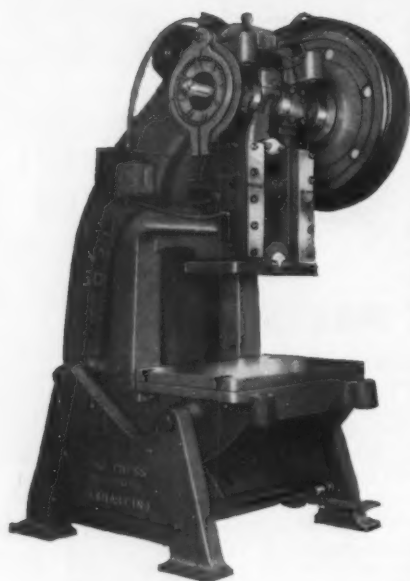
Engineering test information is provided by a large compression testing unit designed and built for engineering laboratory use. It features an electronically controlled graphic recorder. This plots an X-Y coordinate curve of deflection vs. loading. Other features include variable speed motor control for adjusting the movement of the upper platen from 0.200 to 40 ipm, and a

72-in. stroke of the upper platen. This provides ample working space between the platens. The setup is adaptable for performing most types of compression tests. It has a capacity of 8½ tons. Compression tests are performed by a 70 x 48-in. upper platen. Platen movement is controlled by the engineer or lab technician from an operating station mounted adjacent to the scale indicating mechanism. *Toledo Scale Co.*

For more data circle No. 42 on postcard, p. 145



EXTRA CAPACITY WITH PRECISION TO MATCH



Large area dies are no problem when you have an L&J No. 50 Series press with its extra capacity. The exceptionally heavy frame provides maximum rigidity which enables the flanged, box-type ram to maintain precision alignment for precision jobs. The large work area will permit you to run a greater variety of work. Its dependability and tooling ease provide a new high in press efficiency.

Available in geared and non-geared models. Air clutch is available. It will pay you to get complete details now.

SPECIFICATIONS

Capacity: Model 50—50 tons, Model 50B—56 tons. Shut Height: 10" to 25". Ram Stroke: 3" to 8". Ram Adjustment: 3". Ram Face: 24" x 12". Bolster Plate: 36" x 24" x 2¼". Throat Depth: 12½". Opening Thru Back: 22". Speed: Model 50 Non-geared—100 S.P.M., Geared—50 S.P.M. Model 50B Non-geared—95 S.P.M. Geared—46 S.P.M. Higher speeds with air clutch.

Write for Bulletin L-14



Describes L&J O.B.I. Presses. 23 Models, 14 to 90 tons, geared and non-geared. Also, 20 to 90 ton Double Crank, High Speed, Straight Side Presses.

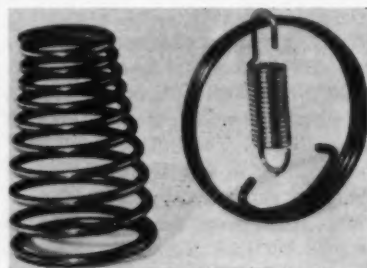
L&J PRESS CORPORATION

1623 STERLING AVENUE, ELKHART, INDIANA



Spring wires

Two new spring wires provide close dimensional and load tolerances. In addition, use of this improved wire on the easier springs results in increased production and a lower rejection rate, the maker says. One wire has a chemically-prepared, non-metallic coating resulting in lower out-of-round characteristics than conventional music wire. The coating also provides excellent lubrication during coil winding ac-



cording to findings during pilot runs involving about 500,000 lb of wire. The other wire meets a need for a more uniform corrosion-resistant music wire required for precision springs. *National-Standard Co.*

For more data circle No. 43 on postcard, p. 145

Steel plate

Easily cut steel plate is included among one company's newest leaded steels. It is especially suited for making die bases, jigs, molds, and other products in which considerable machining is involved. *Joseph T. Ryerson & Son, Inc.*

For more data circle No. 44 on postcard, p. 145

"WE braise this part for less than 5 cents in our Harper Mesh Belt Brazing Furnace"



Harper 135KW, 16" Mesh Belt Furnace in use brazing 600 pieces per hour of the power steering reservoir shown at left. Temperature 2100° F. Silicon carbide elements divided into 3 zones for flexible heat control.

Reliable Metallurgical Service in Cleveland is thriving for only one reason: they are able to produce high-quality copper-brazed steel parts at a price which not only saves real money for their customers but which is also competitive with other custom-brazing plants.

Says metallurgist G. H. (Whitey) Griffiths, President of Reliable: "In custom brazing work, we must sell our furnace time at a profit and still be competitive. Our Harper mesh belt furnace consistently produces uniformly bright, quality work at a low cost and with few rejects and minimum downtime. That's all I want in a brazing furnace."

In this highly competitive business, furnace costs are watched carefully because a fraction of a cent per

part may make the difference between getting and losing a large order. And one of the reasons why Reliable and many other manufacturers choose Harper mesh belt protective-atmosphere furnaces is the low overall cost resulting from the use of silicon carbide heating elements. The high concentration of power in these elements means up to 50% more productive capacity for a given size furnace. Also, with proper operating procedures these efficient elements give good life, and when necessary, replacements can be made quickly and without appreciable downtime.

Check Harper brazing furnaces before you buy. As a starter, mail the coupon today for your copy of bulletin "Harper Mesh Belt Conveyor Furnaces".



HARPER

ELECTRIC FURNACES

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ANNEALING, FORGING and RESEARCH

HARPER ELECTRIC FURNACE CORP.
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Please send me Harper Mesh Belt Conveyor Furnace
Bulletin No. 454.

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Company

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Taking open hearth sample
at the Inland Steel Co.



Checking refractory samples
at Laclede-Christy.

Here's where steel quality starts

QUALITY CONTROL of refractories is much like quality control for steel. Technicians maintain exact control of ingredients throughout the entire production process.

CONSTANT RESEARCH of new refractory material and superior methods of production go into Laclede's "quality-first" refractories. At Inland Steel or in your plant Laclede means dependability. Long life and low operating costs are synonymous with Laclede-Christy refractories.

SERVICE TO CUSTOMERS is Laclede's way of earning your business. Your steel mill refractories are readily available through one of Laclede's nearby sources of supply.

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The Iron Age SUMMARY...

Detroit is beginning to move . . . Heavier demand from automakers will tighten market all around . . . Freight car shortage piling up finished steel . . . Ore problem.

Detroit Moves . . . Jittery steel producers are beginning to get the word from Detroit this week. And it looks as though the automakers are ready to bear down on the throttle.

Mills in at least one large producing center report that major auto companies are taking about 100 per cent of their normal tonnage of sheet for December. This was a change for the better compared with automotive orders covering November shipments.

It could be the forerunner of much heavier orders to come. Detroit has been playing it close to the vest this year, and when the buying public gets its first good look at the new models, the flood gates may swing open.

This would complicate an already touchy situation for the mills. Even without benefit of significant automotive business, producers have been operating at capacity and above to keep pace with demand. And in some products it's been a losing battle. The strength of demand has been surprisingly strong in nearly all major industries.

Freight Problems . . . Meanwhile, the freight car shortage is growing worse. Scarcity of gondola cars is forcing mills to pile up finished steel at

shipping docks. Unfortunately, part of the freight car log jam is due to heavy all-rail shipments of iron ore as steel producers struggle to offset last summer's ore boat strike and avert a shortage next spring.

An ace-in-the-hole for U. S. steel producers is Europe. England and the Continent are starving for steel and would be happy to buy it from American mills. But they don't have a chance so long as the current tight market persists.

And it looks as though U. S. steel demand will become progressively tighter through the fourth quarter and carry over into first quarter of 1957.

The situation in plates and structurals is so desperate that the mills are feeling pressure from Congressmen and other government people to do something about it. The proposed construction of a U. S. fleet of large oil tankers compounds the worries of plate producers.

Building Delayed . . . Shortage of structurals has forced a large fabricator to turn down business unless his customers are willing to accept delivery promises 19 and 20 months hence. Some linepipe orders for large diameter pipe are filling a few shops through 1958. Large building steel promises are generally "out" for 1957.

Steel Output, Operating Rates

	This Week	Last Week	Month Ago	Year Ago
Production (Net tons, 000 omitted)	2,511	2,486	2,437	2,340
Ingot Index (1947-1949=100)	158.3	154.8	151.5	145.5
Operating Rates				
Chicago	103.0	101.0	102.0	98.5
Pittsburgh	102.0	101.0*	98.0	102.0
Philadelphia	104.0	104.0	105.0	103.0
Valley	98.0	98.0*	97.0	100.0
West	105.0	105.0*	99.0	91.0
Detroit	105.0	106.0	104.0	98.0
Buffalo	105.0	105.0*	105.0	105.0
Cleveland	104.0	103.0*	108.0	105.0
Birmingham	96.0	96.0	96.0	97.5
S. Ohio River	93.0	88.0*	86.0	86.0
Upper Ohio R.	104.0	104.0*	98.0	104.0
St. Louis	103.0	106.0	88.0	106.0
Northeast	100.0	100.0	100.0	92.0
Aggregate	102.0	101.0	101.0	97.0

*Revised

Prices At A Glance

(cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	5.622	5.622	5.622	5.174
Pig Iron (Gross Ton)	\$63.04	\$63.04	\$63.04	\$59.09
Scrap, No. 1 hvy (gross ton)	\$56.17	\$56.17	\$58.83	\$44.83
Nonferrous				
Aluminum ingot	27.10	27.10	27.10	24.40
Copper, electrolytic	40.00	40.00	40.00	43.00
Lead, St. Louis	15.80	15.80	15.80	15.30
Magnesium ingot	36.00	36.00	36.00	33.25
Nickel, electrolytic	64.50	64.50	64.50	64.50
Tin, Straits, N. Y.	106.75	104.00	106.00	96.125
Zinc, E. St. Louis	13.50	13.50	13.50	13.00

*Revised

Sheet-Strip Getting Tight

Increased orders from carmakers just about close out books on h-r and c-r sheet and strip . . . More automotive demand may come . . . Conversions set up for h-r sheet.

♦ **TWO MORE CANDIDATES** — sheet and strip—are rapidly working their way to the top of the "most wanted" list.

With automakers taking full tonnage and above for December the supply strait-jacket is settling about both hot and cold-rolled sheet and strip. Cold-rolled products are fast catching up to hot-rolled in the critical classification.

While some strip tonnage is still being offered for December delivery in one market area the order books on hot and cold-rolled sheet are just about closed out for the year. Conversions are being booked on hot-rolled sheet for December delivery.

If reports that automotive steel buyers don't have enough inventory to cover fourth quarter production schedules prove true, the supply drought will get even drier.

PLATES AND STRUCTURALS . . . Supply situation at Pittsburgh gives indication of further tightening. Brokers are commanding premium prices. Small amount of plate now being rolled on sheet mills will probably be dropped as demand for flat rolled products gets tighter.

Schedules at Chicago are being thrown off by additional conversion and some military rated orders. Carryovers are creeping up from 2 to 4 weeks. Oil companies are attempting to get conversion plate for line pipe directly rather than by going through line pipe fabricators. Structurals are sold out through the first half of 1957.

On the West Coast customers for structurals are pushing the mills hard. Construction projects are the main impetus behind demand.

WAREHOUSES . . . There's an upsurge in demand at Detroit for cold-rolled sheet with indication that buyers are getting uneasy about future supplies.

Chicago warehouses report business fair to good. Demand is off on cold-rolled sheet and strip according to some outlets. Others, however, are trying to accumulate inventory, especially for cold-rolled sheet.

Demand at Pittsburgh for cold-rolled strip has picked up. Cold-rolled sheet is described as slow. Hot-rolled products are available, but warehouses want more from the mills. Plate and structurals still tight.

BARS . . . Carbon bars are rapidly becoming one of the tightest items at Detroit. Mills blame it on overall demand. Similarly at Pittsburgh, hot-rolled carbon bars in all sizes continue to show demand that exceeds supply. While implement market is still off, automotive buyers would like more tonnage than they are getting. Cold finished bars are in somewhat better balance.

Cold finished bar delivery times from Cleveland mills have decreased from one month until they're now one or two weeks, depending on size. Hot-rolled bar production continues heavy but isn't cutting into cold-finished bars.



Purchasing Agent's Checklist

CONSTRUCTION: Highway builders blueprint their steel needs. . . p. 86

BUSINESS: Tight money hits machine tool market . . . p. 87

MARKETING: Foundries aiming at \$3 billion in sales on record tonnage . . . p. 90

PRODUCTION: Fastener manufacturers are doing fair to good but picture is varied . . . p. 91

WEST COAST: Metals industry will have important part in changing aircraft production picture. p. 107

TECHNICAL: Improved mold sands drop shell-casting costs. . . p. 132

At Chicago cold-finished is still heading upward in weekly volume. Deliveries are extending to as much as six weeks because of lack of hot-rolled. Hot-rolled carryovers are now 2-4 weeks, with mills sold out into first quarter. Situation is expected to get worse in December, when both automotive buying and farm equipment buying are expected to hit in increased quantity.

WIRE . . . Heavy grades of manufacturing wire are tightening at Detroit. Market for spring wire continues good with indications that fourth quarter will be sold out.

Manufacturers' wire deliveries at Cleveland are running 4 to 6 weeks with some specialty products going up to 11 weeks. Merchant wire deliveries vary from 3 to 8 weeks. This is somewhat longer than usual during this off-season.

At Chicago manufacturers' wire is reported for up to six weeks deliveries. However, every mill in the area seems to be tied up solid for this quarter with a runover into the next. Wire mills seem to be noticing some automotive strength—at least in comparison with other steel product producers.

SHEET AND STRIP . . . Major auto firms took just about 100 pct of their normal tonnage for December from Cleveland and Northeastern Ohio mills. With auto buyers after full tonnage for the final month—two even put in orders for larger amounts—there are predictions of strong first quarter production. Cold-rolled strip deliveries are running 5 to 6 weeks with some indication of further lengthening if auto supplier tonnage materializes.

However, at Pittsburgh auto producers are still not picking up the full tonnages set aside for them. Warehouses say they are being offered sheets for November.

There are indications at Detroit that the cold-rolled market will soon tighten up. Hot-rolled products are already critical.

Mills at Chicago indicate that hot and cold-rolled sheet are as good as sold out for remainder of the year. Carryovers on hot-rolled sheet are beginning to build up, with some deliveries running three to four weeks late. Conversion deals are being booked on hot-rolled sheet for December delivery. Producers are wondering why local cold-rolled sheet buyers aren't more worried about prospective automotive buying and the effect it's bound to have on cold-rolled. Hot-rolled sheet conversion orders and inquiries are coming into the area.

Comparison of Prices

(Effective Oct. 16, 1956)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

	Oct. 16 1956	Oct. 9 1956	Sept. 18 1956	Oct. 18 1955
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	4.675¢	4.675¢	4.675¢	4.325¢
Cold-rolled sheets	5.75	5.75	5.75	5.325
Galvanized sheets (10 ga.)	6.30	6.30	6.30	5.86
Hot-rolled strip	4.675	4.675	4.675	4.325
Cold-rolled strip	6.870	6.870	6.870	6.29
Plate	4.87	4.87	4.87	4.52
Plates, wrought iron	10.40	10.40	10.40	9.30
Stain's C-R strip (No. 802)	47.50	47.50	47.50	44.50

Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) coils	\$9.85	\$9.85	\$9.85	\$9.05
Tinplates, electro (0.80 lb.)	8.55	8.55	8.55	7.75
Special coated mfg. ternes	9.10	9.10	9.10	7.85

Bars and Shapes: (per pound)				
Merchant bars	5.075¢	5.075¢	5.075¢	4.65¢
Cold finished bars	6.85	6.85	6.85	5.90
Alloy bars	6.125	6.125	6.125	5.65
Structural shapes	5.00	5.00	5.00	4.60
Stainless bars (No. 802)	40.75	40.75	40.75	38.25
Wrought iron bars	11.50	11.50	11.50	10.40

Wire: (per pound)				
Bright wire	7.20¢	7.20¢	7.20¢	6.25¢
Rails: (per 100 lb.)				
Heavy rails	\$5.075	\$5.075	\$5.075	\$4.725
Light rails	6.00	6.00	6.00	5.65

Semifinish Steel: (per net ton)				
Rerolling billets	\$74.00	\$74.00	\$74.00	\$68.50
Slabs, rerolling	74.00	74.00	74.00	68.50
Forging billets	91.50	91.50	91.50	84.50
Alloy blooms, billets, slabs	107.00	107.00	107.00	96.00

Wire Rod and Skelp: (per pound)				
Wire rods	5.80¢	5.80¢	5.80¢	5.025¢
Skelp	4.225	4.225	4.225	4.225

Finished Steel Composite: (per pound)				
Base price	5.622¢	5.622¢	5.622¢	5.174¢

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

	Oct. 16 1956	Oct. 9 1956	Sept. 18 1956	Oct. 18 1955
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	\$67.76	\$67.76	\$67.76	\$63.69
Foundry, Valley	63.00	63.00	63.00	59.00
Foundry, Southern Cin'ti	67.17	67.17	67.17	62.93
Foundry, Birmingham	59.00	59.00	59.00	55.00
Foundry, Chicago	63.00	63.00	63.00	59.00
Basic del'd Philadelphia	66.84	66.84	66.84	62.77
Basic, Valley furnace	62.50	62.50	62.50	58.50
Malleable, Chicago	63.00	63.00	63.00	59.00
Malleable, Valley	63.00	63.00	63.00	59.00
Ferromanganese, cents per lb.	11.75¢	11.75¢	10% - 11% [†]	9.50¢
74 to 76 pct Mn base.				

Pig Iron Composite: (per gross ton)				
Pig iron	\$63.04	\$63.04	\$63.04	\$59.09

Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	\$55.50	\$55.50	\$55.50	\$44.50
No. 1 steel, Phila. area	56.50	56.50	56.50	46.50
No. 1 steel, Chicago	56.50	56.50	56.50	43.50
No. 1 bundles, Detroit	56.50	56.50	56.50	39.00
Low phos., Youngstown	64.50	64.50	64.50	49.00
No. 1 mach'y cast, Pittsburgh	59.50	59.50	60.50	49.50
No. 1 mach'y cast, Philadel'a	58.00	57.50	58.00	47.50
No. 1 mach'y cast, Chicago	56.50	57.50	60.00	53.50

Steel Scrap Composite: (per gross ton)				
No. 1 heavy melting scrap	\$56.17	\$56.17	\$58.83	\$44.83

Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	\$14.50	\$14.50	\$14.50	\$13.25
Foundry coke, prompt	\$17.18	\$17.18	\$17.18	16.25

Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	40.00	40.00	40.00	43.00
Copper, Lake, Conn.	40.00	40.00	40.00	43.00
Tin, Straits, New York	166.75¢	164.00	166.00	96.125
Zinc, East St. Louis	13.50	13.50	13.50	13.00
Lead, St. Louis	15.80	15.80	15.80	15.30
Aluminum, virgin ingot	27.10	27.10	27.10	24.40
Nickel, electrolytic	64.50	64.50	64.50	64.50
Magnesium, ingot	36.00	36.00	36.00	33.25
Antimony, Laredo, Tex.	33.00	33.00	33.00	33.00

† Tentative. ‡ Average. * Revised.

FIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

STAINLESS STEEL

←To identify producers, see Key on p. 196→

Producing Point	Basic	Fdy.	Mall.	Beas.	Low Phos.
Bethlehem B3	64.50	65.00	65.50	66.00	.....
Birdsboro, Pa. B6	64.50	65.00	65.50	66.00	.....
Birmingham R9	58.50	59.00*	.....	.....	.....
Birmingham W3	58.50	59.00*	63.00	.....	.....
Birmingham W4	58.50	59.00*	63.00	.....	.....
Buffalo R3	62.50	63.00	63.50	64.00	.....
Buffalo H1	62.50	63.00	63.50	64.00	.....
Buffalo W6	62.50	63.00	63.50	64.00	.....
Chester P2	64.50	65.00	65.50	.....	.....
Chicago J4	62.50	63.00	63.00	63.50	.....
Cleveland A5	62.50	63.00	63.00	63.50	67.50†
Cleveland R3	62.50	63.00	63.00	63.50	.....
Dubuque J4	62.50	63.00	63.00	63.50	67.50†
Erie J4	62.50	63.00	63.00	63.50	67.50†
Everett M6	62.50	63.00	63.00	63.50	.....
Fontana K1	70.00	70.50	.....	.....	.....
Gonave, Utah C7	62.50	63.00	.....	.....	.....
Granite City G2	64.40	64.90	65.40	.....	.....
Hubbard Y1	.....	.....	63.00	.....	.....
Lone Star L3	58.50†	59.00†	.....	.....	.....
Midland C11	62.50	.....	.....	.....	.....
Minnesota C6	64.50	65.00	65.50	.....	.....
Monessen P6	62.50	.....	.....	.....	.....
Norville Ia. P4	62.50	63.00	63.00	63.50	67.50†
N. Tonawanda T1	62.50	63.00	63.00	63.50	64.00
Pittsburgh U1	62.50	63.00	63.00	63.50	.....
Sharpsville S3	62.50	63.00	63.00	63.50	.....
Sa. Chicago R3	62.50	63.00	63.00	63.50	.....
Swanton B3	64.50	65.00	65.50	66.00	70.50
Svealand A2	64.50	65.00	65.50	66.00	.....
Tulsa J4	62.50	63.00	63.00	63.50	.....
Tray, N. Y. R3	64.50	65.00	65.50	66.00	.....
Youngstown Y1	62.50	63.00	63.00	63.50	.....

DIFFERENTIALS: Add, 50¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.50 pct manganese or portion thereof over 1 pct, \$2 per ton for 8.5 to 9.75 pct nickel, \$1 for each additional 0.25 pct nickel. * Add \$1.00 for 0.31-0.89 pct phos. † Intermediate low phos. ‡ Add \$1.00 for 0.31 to 0.50 pct. phos.
Silvery Iron: Buffalo, H1, \$72.50; Jackson, J1, J4 (Globe Div.), \$71.50; Niagara Falls (15.01-15.50), \$69.50; Kokuk (14.01-14.50), \$102.00; (15.51-16.00), \$105.00. Add \$1.25 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 14 pct. Add 75¢ for each 0.50 pct manganese over 1.0 pct. Base price for silicon: \$64.00.

Product	201	202	301	302	303	304	310	321	347	403	410	416	430
Ingot, reroll.	19.75	21.00	28.50	22.00	—	23.25	35.25	28.25	32.75	—	14.00	27.75	16.25
Slabs, billets	24.50	27.25	25.25	28.00	28.90	29.25	44.50	35.75	42.00	—	29.75	—	21.00
Billets, forging	—	33.00	33.75	34.00	37.00	36.00	54.25	42.25	50.25	30.75	27.25	27.75	27.75
Bars, struct.	39.00	39.25	40.50	40.75	43.75	43.00	66.75	50.25	59.00	36.25	32.50	33.00	33.00
Plates	—	41.25	42.50	43.00	45.50	45.75	70.25	54.50	63.75	39.75	33.75	35.50	34.50
Sheets	45.00	45.25	47.25	47.50	55.75	50.25	74.75	60.00	73.00	46.50	38.75	46.50	39.25
Strip, hot-rolled	33.00	35.75	34.00	36.75	—	39.75	63.50	48.75	58.25	—	29.75	—	30.75
Strip, cold-rolled	41.50	45.25	43.75	47.50	52.00	50.25	74.75	60.00	73.00	46.50	38.75	46.50	39.25
Wire CF; Rod HR	—	37.25	38.50	38.75	41.75	41.00	63.75	48.00	58.25	34.50	31.00	31.50	31.50

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., C11; Brackenridge, Pa., A3; Butler, Pa., A7; Vandergrift, Pa., U1; Washington, Pa., W2, J2; Baltimore, Md.; Middletown, O., A7; Massillon, O., R3; Gary, U1; Bridgeville, Pa., U2; New Castle, Ind., J2; Ft. Wayne, J4; Philadelphia, D5.

Strip: Midland, Pa., C11; Waukegan, Cleveland, A5; Carnegie, Pa., S9; McKeesport, Pa., F1; Reading, Pa., C2; Washington, Pa., W2; W. Lechburg, Pa., A3; Bridgeville, Pa., U2; Detroit, M2; Canton-Massillon, O., R3; Harrison, N. J., D3; Youngstown, C3; Sharon, Pa., S1; Butler, Pa., A7; Wallingford, Conn., U3 (plus further conversion extras); W1 (.25 pct lb higher); New Bedford, Mass., R6; Gary, U1 (.25 pct lb higher).

Bar: Baltimore, A7; S. Duquesne, Pa., U1; Munhall, Pa., U1; Reading, Pa., C2; Titusville, Pa., U2; Washington, Pa., J2; McKeesport, Pa., U1, F1; Bridgeville, Pa., U2; Dunkirk, N. Y., A3; Massillon, O., R3; S. Chicago, U1; Syracuse, N. Y., C11; Watervliet, N. Y., A3; Waukegan, Pa., U1; Canton, O., T5; Ft. Wayne, J4; Philadelphia, D5; Detroit, R5; Gary, U1.

Wire: Waukegan, A5; Massillon, O., R3; McKeesport, Pa., F1; Ft. Wayne, J4; Harrison, N. J., D3; Baltimore, A7; Dunkirk, A3 (.25 pct lb lower on Types 301, 303 and 316); Monmouth, F1; Syracuse, C11 (.25 pct lb lower on Type 301, 304, and 304); Bridgeville, U2.

Structurals: Baltimore, A7; Massillon, O., R3; Chicago, Ill., J4; Watervliet, N. Y., A3; Syracuse, C11; S. Chicago, U1.

Plates: Brackenridge, Pa., A3; Chicago, U1; Munhall, Pa., U1; Midland, Pa., C11; New Castle, Ind., J2; Middletown, A7; Washington, Pa., J2; Cleveland, Massillon, R3; Cantonville, Pa., C13; Philadelphia, D5; Vandergrift, Pa., U1; Gary, U1.

Forging billets: Midland, Pa., C11; Baltimore, A7; Washington, Pa., J2; McKeesport, F1; Massillon, Canton, O., R3; Watervliet, A3; Pittsburgh, Chicago, U1; Syracuse, C11; Detroit, R3; Munhall, Pa., S. Chicago, U1.

Car Shortage Affects Market

Rail car famine prevents mills from reaching out for scrap . . . Market firm after period of decline . . . Export stays strong . . . Japan raids West Coast for heavy tonnage.

◆ AN UNEXPECTED ASSIST to continued high prices entered the scrap market in the form of the shortage of railroad cars.

While the freight car famine is an artificial factor at best, it is preventing mills in some areas from reaching out for available scrap and is cutting into mill inventories.

As a result of this, in combination with a number of other factors, scrap prices have halted their decline of the past few weeks and appear to be stabilizing in most areas.

In addition to the freight car shortage, mill inventories are not excessive and rebuilding of some inventories will be necessary. Continued high rate of operation offsets the greater flow of industrial scrap, principally from rejuvenated automotive lists.

Export continues to be a factor, but some signs of a slowing export market are evident on the East Coast. The opposite is true on the West Coast where Japanese demand is keeping prices high. Japan is even negotiating for pig iron from a Coast mill.

As a result of a firming market, THE IRON AGE Composite Price held at \$56.17. Previous predictions of a continued sliding market, which were the rule in the trade a week ago, have now been replaced by general reports of a continued firm market.

Pittsburgh . . . Prices of openhearth scrap are holding firm as the shortage of gondola cars continues to restrict shipments. The market is quiet, but there are signs of gathering strength. Dealers have been paid as much as \$57 on \$56 mill orders. Final railroad list showed most grades equalling or bettering earlier figures. An unusual

situation has developed in railroad grades, with random length rails going at higher prices than short rails. Answer probably is that re-rollers are active in the bidding.

Chicago . . . In a relatively dull market, scrap continues to move at the bottom of the price spread. But with a number of older orders still to be filled, brokers hesitate to fill new orders at lower prices despite continued mill pressure. Dealer prices, after slipping in recent weeks, have firmed considerably, and in a scattering of grades even indicated mild advances. Turnings continue to hold firm. Mill offers to buy at the bottom of the price spread brought out some tonnages, but were also turned down by a number of brokers. Despite the upturn in manufacturing and scrap generation, dealers are content to rebuild inventories rather than reduce prices.

Philadelphia . . . The market held steady after several weeks of downward readjustment to topheavy prices. Only change recorded was for No. 1 machinery cast, based on foundry purchases. Scrap is coming into yards in fair quantity. Export activity is drawing off whatever excess the market contains, and with two or three more boats scheduled to tie up this month, foreign buyers will continue to add strength here.

New York . . . The recent downturn of the market has been arrested. Prices have firmed at present levels and feeling is that this level will be at the least maintained. General market strength is apparent and dealers are complaining about strict inspection at one nearby mill.

Detroit . . . No new activity has been reported here. Brokers and dealers are concentrating on filling old orders and there is no urgency on the part of consumers to place any new business. Amount of scrap available continues to increase as new

model production gets into full swing. Consumers, who were predicting lower prices last week, now don't forecast any change until the end of the month.

Cleveland . . . The market remains firm but slow with some fall-off in shipments due to shortage of railroad cars. Some yards have been idled by car shortage and some mill inventories are suffering. One minor purchase of 2-ft cut structural and plate by a local foundry at \$1.50 under previous price was only significant activity.

Birmingham . . . Both domestic and export markets present a lethargic appearance, with buying rated only nominal. Practically all the activity is in foundry steel and cast, but orders are rather limited at present prices. With weakness indicated in the market, dealers are unwilling to pay recent prices and receipts have dropped off.

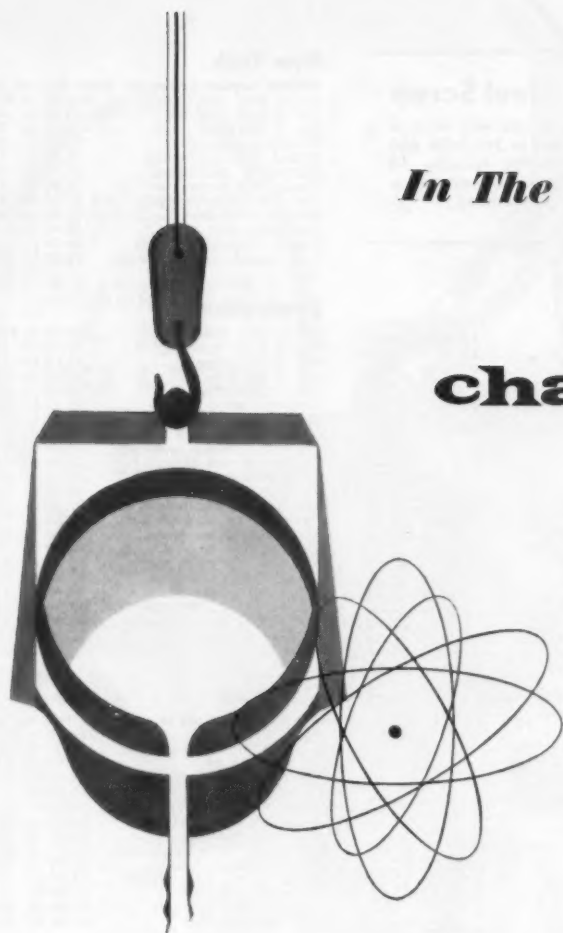
St. Louis . . . Shipments of scrap have been very heavy and exceed mill requirements. This situation is regarded as satisfactory in view of the continued high operating rate and the desire to pile up inventories against winter curtailment. Prices are unchanged and are likely to remain so through October.

Cincinnati . . . Shipments continue good on old orders, but a mid-month lull has set in on new ones. Both major area mills have monthly orders out with good shipments coming in. One mill is buying some tonnage direct from dealers' yards as well as through brokers at \$1 ton differential.

Buffalo . . . The market shows signs of softening somewhat. No sales were reported during the past week and dealers believe the area's biggest consumer may be stalling. Shipping on all past orders is now almost caught up.

Boston . . . Continued quiet is the report on this market. Export is off and only one area consumer is active in the market. Prices are still holding, but the market may be easing.

West Coast . . . Prices remain firm in San Francisco, Los Angeles, and Seattle. Japan is negotiating a new large pig iron contract with a West Coast mill. Six cargoes of scrap left for Japan during October from Los Angeles alone.



In The Steel Industry...

**yesterday's
challenge
is in
production
today**

Not long ago, only the word "impossible" could have described the things that are being asked of—and accomplished by—steel today.

The ever-increasing scope of today's technology keeps presenting challenges to the steel industry through demands for performance and stamina characteristics that once would have been considered fantastic.

But meeting such challenges is a matter of routine for the industry. Producers have developed steels for purposes as divergent as jet engines and jelly kettles. Whatever the steel problem, there is—or soon will be—a specially-developed analysis that solves it.

Steel begins with scrap. Like the steel of which it is a part, scrap must meet a challenge, and it's long been our responsibility to supply steel producers with the kind of scrap that helps them put yesterday's challenge into production today.

The LUNTZ Iron & Steel Company

canton, ohio — cleveland, ohio — detroit, michigan
kokomo, indiana — warren, ohio — pittsburgh, pa.

Scrap Prices (Effective Oct. 16, 1956)

Pittsburgh

No. 1 hvy. melting	\$55.00 to \$56.00
No. 2 hvy. melting	45.00 to 50.00
No. 1 bundles	55.00 to 56.00
No. 2 bundles	45.00 to 47.00
Machine shop turn.	38.00 to 39.00
Mixed bor. and ma. turn.	38.00 to 39.00
Shoveling turnings	42.00 to 43.00
Cast iron borings	42.00 to 43.00
Low phos. punch'g plate	66.00 to 67.00
Heavy turnings	52.00 to 53.00
No. 1 RR. hvy. melting	65.00 to 66.00
Scrap rails, random lgth.	80.00 to 81.00
Rails 2 ft and under	79.00 to 80.00
RR. steel wheels	73.00 to 74.00
RR. spring steel	73.00 to 74.00
RR. couplers and knuckles	73.00 to 74.00
No. 1 machinery cast.	59.00 to 60.00
Cupola cast.	51.00 to 52.00
Heavy breakable cast.	49.00 to 50.00

Chicago

No. 1 hvy. melting	\$56.00 to \$57.00
No. 2 hvy. melting	46.00 to 47.00
No. 1 factory bundles	62.00 to 64.00
No. 1 d-niers' bundles	55.00 to 57.00
No. 2 dealers' bundles	41.00 to 42.00
Machine shop turn.	35.00 to 36.00
Mixed bor. and turn.	37.00 to 38.00
Shoveling turnings	37.00 to 38.00
Cast iron borings	37.00 to 38.00
Low phos. forge crops	69.00 to 70.00
Low phos. punch'g plate	66.00 to 67.00
Low phos. 3 ft and under	64.00 to 65.00
No. 1 RR. hvy. melting	63.00 to 65.00
Scrap rails, random lgth.	73.00 to 74.00
Rerolling rails	84.00 to 85.00
Rails 2 ft and under	83.00 to 84.00
Locomotive tires, cut	68.00 to 69.00
Cut bolsters & side frames	68.00 to 69.00
Angles and splice bars	73.00 to 74.00
RR. steel car axles	87.00 to 88.00
RR. couplers and knuckles	67.00 to 68.00
No. 1 machine cast.	56.00 to 57.00
Cupola cast.	51.00 to 52.00
Heavy breakable cast.	45.00 to 46.00
Cast iron brake shoe	47.00 to 48.00
Cast iron wheel	56.00 to 57.00
Malleable	69.00 to 70.00
Stove plate	47.00 to 48.00
Steel car wheels	68.00 to 69.00

Philadelphia Area

No. 1 hvy. melting	\$56.00 to \$57.00
No. 2 hvy. melting	47.00 to 48.00
No. 1 bundles	56.00 to 57.00
No. 2 bundles	45.00 to 46.00
Machine shop turn.	40.00 to 41.00
Mixed bor. short turn.	40.00 to 41.00
Cast iron borings	40.00 to 41.00
Shoveling turnings	44.00 to 45.00
Clean cast chem. borings	46.00 to 47.00
Low phos. 5 ft and under	61.00 to 62.00
Low phos. 2 ft and under	62.00 to 63.00
Low phos. punch'g	62.00 to 63.00
Elec. furnace bundles	60.00 to 61.00
Heavy turnings	52.00 to 53.00
RR. steel wheels	69.00 to 70.00
RR. spring steel	69.00 to 70.00
Rails 18 in. and under	76.00 to 77.00
Cupola cast.	52.00 to 54.00
Heavy breakable cast	55.00 to 57.00
Cast iron car wheels	64.00 to 65.00
Malleable	68.00 to 69.00
Unstripped motor blocks	44.00 to 45.00
No. 1 machinery cast.	57.00 to 59.00

Cleveland

No. 1 hvy. melting	\$61.00 to \$62.00
No. 2 hvy. melting	46.00 to 47.00
No. 1 bundles	61.00 to 62.00
No. 2 bundles	39.00 to 40.00
No. 1 busheling	61.00 to 62.00
Machine shop turn	33.00 to 34.00
Mixed bor. and turn.	37.00 to 38.00
Shoveling turnings	37.00 to 38.00
Cast iron borings	37.00 to 38.00
Cut struct'l & plates, 2 ft & under	64.50 to 65.50
Drop forge flashings	62.50 to 63.50
Low phos. punch'g plate	62.00 to 63.00
Foundry steel, 2 ft & under	56.00 to 57.00
No. 1 RR. heavy melting	65.00 to 66.00
Rails 2 ft and under	82.00 to 83.00
Rails 18 in. and under	83.00 to 84.00
Railroad grate bars	47.00 to 48.00
Steel axle turnings	43.00 to 44.00
Railroad cast.	60.00 to 61.00
No. 1 machinery cast.	57.00 to 58.00
Stove plate	54.00 to 55.00
Malleable	70.00 to 71.00

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Youngstown

No. 1 hvy. melting	\$63.00 to \$64.00
No. 2 hvy. melting	48.00 to 49.00
No. 1 bundles	63.00 to 64.00
No. 2 bundles	45.00 to 46.00
Machine shop turn.	34.00 to 35.00
Shoveling turnings	40.00 to 41.00
Cast iron borings	40.00 to 41.00
Low phos. plate	64.00 to 65.00

Buffalo

No. 1 hvy melting	\$54.00 to \$55.00
No. 2 hvy. melting	45.00 to 46.00
No. 1 busheling	54.00 to 55.00
No. 1 bundles	54.00 to 55.00
No. 2 bundles	42.00 to 43.00
Machine shop turn	30.00 to 31.00
Mixed bor. and turn.	32.00 to 33.00
Shoveling turnings	34.00 to 35.00
Cast iron borings	32.00 to 33.00
Low phos. plate	59.00 to 60.00
Scrap rails, random lgth.	57.00 to 58.00
Rails 2 ft and under	77.00 to 78.00
RR. steel wheels	60.00 to 61.00
RR. spring steel	60.00 to 61.00
RR. couplers and knuckles	70.00 to 71.00
No. 1 machinery cast.	52.00 to 53.00
No. 1 cupola cast.	48.00 to 49.00

Detroit

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$55.00 to \$56.00
No. 2 hvy. melting	40.00 to 41.00
No. 1 bundles, openhearth	56.00 to 57.00
No. 2 bundles	35.00 to 36.00
New busheling	55.00 to 56.00
Drop forge flashings	54.50 to 55.50
Machine shop turn.	29.00 to 30.00
Mixed bor. and turn.	32.00 to 33.00
Shoveling turnings	32.00 to 33.00
Cast iron borings	32.00 to 33.00
Low phos. punch'g, plate	55.00 to 56.00
No. 1 cupola cast.	51.00 to 52.00
Heavy breakable cast.	44.00 to 45.00
Stove plate	45.00 to 46.00
Automotive cast.	54.00 to 55.00

St. Louis

No. 1 hvy. melting	\$52.00 to \$53.00
No. 2 hvy. melting	45.00 to 46.00
No. 1 bundles	55.00 to 56.00
No. 2 bundles	41.00 to 42.00
Machine shop turn	34.00 to 35.00
Cast iron borings	35.00 to 36.00
Shoveling turnings	35.00 to 36.00
No. 1 RR. hvy. melting	62.50 to 63.50
Rails, random lengths	75.00 to 76.00
Rails 18 in. and under	79.00 to 80.00
Locomotive tires uncut	64.00 to 65.00
Angles and splice bars	68.00 to 69.00
Std. steel car axles	78.00 to 79.00
RR. specialties	66.50 to 67.50
Cupola cast.	52.00 to 53.00
Heavy breakable cast.	43.00 to 44.00
Cast iron brake shoes	50.00 to 51.00
Stove plate	44.00 to 45.00
Cast iron car wheels	53.00 to 54.00
Rerolling rails	89.00 to 90.00
Unstripped motor blocks	43.00 to 44.00

Boston

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$48.00 to \$49.00
No. 2 hvy. melting	37.00 to 37.50
No. 1 bundles	48.00 to 49.00
No. 2 bundles	35.00 to 35.50
No. 1 busheling	48.00 to 49.00
Elec. furnace, 3 ft & under	51.00 to 52.00
Machine shop turn.	29.00 to 30.00
Mixed bor. and short turn.	31.00 to 32.00
Shoveling turnings	32.00 to 33.00
Clean cast chem. borings	34.00 to 35.00
No. 1 machinery cast.	45.00 to 46.00
Mixed cupola cast.	40.00 to 41.00
Heavy breakable cast.	44.00 to 45.00
Stove plate	39.00 to 40.00
Unstripped motor blocks	32.00 to 33.00

New York

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$52.00 to \$53.00
No. 2 hvy. melting	43.00 to 44.00
No. 2 bundles	39.00 to 40.00
Machine shop turn.	31.00 to 32.00
Mixed bor. and turn.	31.00 to 32.00
Shoveling turnings	37.00 to 38.00
Clean cast chem. borings	35.00 to 36.00
No. 1 machinery cast.	52.00 to 53.00
Mixed yard cast.	48.00 to 49.00
Charging box cast.	48.00 to 49.00
Heavy breakable cast.	48.00 to 49.00
Unstripped motor blocks	38.00 to 39.00

Birmingham

No. 1 hvy. melting	\$42.00 to \$43.00
No. 2 hvy. melting	40.00 to 41.00
No. 1 bundles	42.00 to 43.00
No. 2 bundles	34.00 to 35.00
No. 1 busheling	42.00 to 43.00
Machine shop turn.	33.00 to 34.00
Shoveling turnings	35.00 to 36.00
Cast iron borings	30.50 to 31.50
Electric furnace bundles	53.00 to 54.00
Bar crops and plate	59.00 to 60.00
Structural and plate, 2 ft.	57.00 to 58.00
No. 1 RR. hvy. melting	56.00 to 57.00
Scrap rails, random lgth.	69.00 to 70.00
Rails, 18 in. and under	74.00 to 75.00
Angles & splice bars	70.00 to 71.00
Rerolling rails	77.00 to 78.00
No. 1 cupola cast.	53.00 to 54.00
Stove plate	51.00 to 52.00
Charging box cast.	40.00 to 41.00
Cast iron car wheels	45.00 to 46.00
Unstripped motor blocks	45.00 to 46.00
Mashed tin cans	15.00 to 16.00
Elec. furnace, 3 ft & under	51.00 to 52.00

Cincinnati

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$56.00 to \$57.00
No. 2 hvy. melting	45.00 to 46.00
No. 1 bundles	56.00 to 57.00
No. 2 bundles	41.00 to 42.00
Machine shop turn.	35.00 to 36.00
Mixed bor. and turn.	36.50 to 37.50
Shoveling turnings	39.00 to 40.00
Cast iron borings	36.50 to 37.50
Low phos. 18 in. & under	61.00 to 62.00
Rails, random lengths	69.00 to 70.00
Rails, 18 in. and under	76.00 to 77.00
No. 1 cupola cast.	48.00 to 49.00
Hvy. breakable cast.	47.00 to 48.00
Drop broken cast.	58.00 to 59.00

San Francisco

No. 1 hvy. melting	\$55.00
No. 2 hvy. melting	52.00
No. 1 bundles	53.00
No. 2 bundles	40.00
Machine shop turn.	35.00
Cast iron borings	35.00
No. 1 RR. hvy. melting	55.00
No. 1 cupola cast.	60.00

Los Angeles

No. 1 hvy. melting	\$55.00 to \$57.00
No. 2 hvy. melting	52.00 to 54.00
No. 1 bundles	53.00
No. 2 bundles	43.00
Machine shop turn.	35.00
Shoveling turnings	38.00
Cast iron borings	35.00
Elec. furn. 1 ft and under (foundry)	66.00
No. 1 RR. hvy. melting	56.00
No. 1 cupola cast.	60.00

Seattle

No. 1 hvy. melting	\$55.00
No. 2 hvy. melting	52.00
No. 2 bundles	33.00
No. 1 cupola cast.	55.00
Mixed yard cast.	55.00

Hamilton, Ont.

No. 1 hvy. melting	\$52.00
No. 2 hvy. melting	47.00
No. 1 bundles	52.00
No. 2 bundles	40.50
Mixed steel scrap	46.00
Bushellings	39.50
Bush., new fact., prep'd	50.00
Bush., new fact., unprep'd	46.00
Machine shop turn.	31.00
Short steel turn.	35.00
Mixed bor. and turn.	28.00
Rails, rerolling	60.00
Cast scrap	50.00

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OF
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IN
IRON & STEEL
SCRAP
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EXPORTS-IMPORTS LIVINGSTON & SOUTHARD, INC. 99 Park Ave., New York, N. Y. Cable Address: FORENTRACO

October 18, 1956

189

Copper Supply Passes Demand

Domestic producers report orders for November delivery better than 1955 . . . Volume still called small . . . Consumers may be holding back for possible price decline.

♦ AT THE BEGINNING of 1956 it appeared that copper supply and demand might balance before the end of the year. Now it seems that an oversupply in all major world markets is imminent.

Domestic producers find that although November business is a little better than a month ago, volume is still small. Consumers may be staying off the market temporarily in hope of a price decline.

Indications that there is more than enough copper to go around include (1) lower prices in all markets which adhere to supply and demand for pricing, (2) fact that the Suez Canal seizure had little or no effect on British markets, (3) British government's plan to sell 18,000 tons of copper through London Metals Exchange, (4) Chile reports that production for the first 8 months of 1956 far outstripped the same period in 1955.

Chances that primary producers will cut production to balance supply with demand, and thus hold the price line, seem rather slim. Even if they were able to manipulate domestic holdings, things would still go on at capacity in Chile.

The Chilean law which governs

the operations of U. S. subsidiary copper companies provides for a variable surtax of profits which operates on a scale in proportion to production. The higher the output, the lower the tax, and vice versa. A drop in output would cost more than it would save.

Although interested in production statistics only in so far as they reflect company value, a number of Wall Street investment houses are beginning to refer to the copper market as glutted.

British government announced that it will spread out the metal it is putting on the market to March 31, 1957, so as to minimize its effect on price structure.

However the real panacea for copper would be an increase in automotive demand, which has thus far been spotty and a little disappointing.

NICKEL . . . Business and Defense Services Administration, U. S. Dept. of Commerce, will mail questionnaires to all known platers, both job and captive, to collect information concerning their consumption of nickel.

Results will be incorporated in a report to Congress on nickel supply and demand. It is scheduled for delivery on Capitol Hill by no later than Dec. 31, 1956.

While the total reported and esti-

mated consumption will be made public, reports from the individual platers will be kept in strict confidence.

Since the report is required under the Defense Production Act, as amended, nickel platers will be required to supply all information requested in the report.

BDSA is asking platers about receipts of nickel anodes and nickel salts for 1948, 1949, 1950, 1954 and 1955, and January-September, 1956. Figures will be broken down to indicate amounts used for defense work and for non-rated orders.

Receipts of nickel anodes will be reported in three categories: 1) plating suppliers at market prices, 2) plating suppliers at premium prices, 3) other sources.

The announcement by International Nickel of a price increase does not affect consumers in the U. S. Inco boosted the price of electrolytically refined nickel for consumption in Canada from 62¢ to 63¢ per lb. Reason given was to compensate for recent changes in foreign exchange rates and keep domestic (Canada) price in accord with basic export price.

TIN . . . Deadline for submitting bids on the Texas City Smelter is November 1. A representative of the Federal Facilities Corp., responsible for the smelter, has indicated that FFC would like to see a purchaser keep the plant going as a tin smelter. This is considered highly unlikely, since (1) there is more than enough tin being smelted in other world smelters, (2) government stockpile is just about full, (3) much of its equipment can be used in refining other metals.

COLUMBIUM-TANTALUM . . . General Services Administration will buy columbium-tantalum bearing ores and concentrates of domestic origin.

A regulation issued by Franklin G. Floete, GSA administrator, under authority of the Secretary of the Interior, provided for the purchase of a maximum of 250,000 pounds of contained combined pentoxide. Program is scheduled to terminate when this goal has been reached, or Dec. 31, 1958, whichever occurs first.

Columbium-tantalum is used in production of steel with high temperature resistance, considered essential for defense equipment such as jet engines.

Base price of from \$1.40 to \$3 per pound will be paid, depending on composition at three receiving depots; Spruce Pine, N. C.; Custer, S. Dak.; and Franklin, N. H.

Daily Nonferrous Metal Prices

(Cents per lb except as noted)

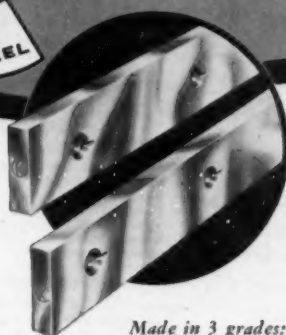
	Oct. 10	Oct. 11	Oct. 12	Oct. 13	Oct. 15	Oct. 16
Copper, electro, Conn.	40.00	40.00	40.00	40.00	40.00	40.00
Copper, Lake, delivered	40.00	40.00	40.00	40.00	40.00	40.00
Tin, Straits, New York	105.00	105.50	....	....	106.50	106.75*
Zinc, East St. Louis	13.50	13.50	13.50	13.50	13.50	13.50
Lead, St. Louis	15.80	15.80	15.80	15.80	15.80	15.80

Note: Quotations are going prices.

*Tentative

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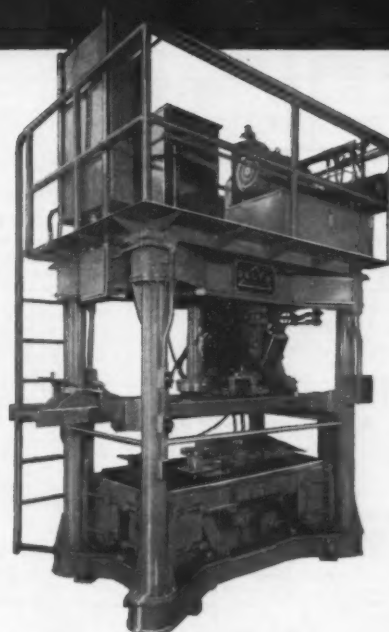
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Foundries, steel mills, power plants—all acclaim this Hayward Electric Clam-Shell as the finest hook-on bucket obtainable. Handles extra large loads safely. Notable for giving many years' service with minimum maintenance. Interchangeable with your electric magnet. The Hayward Company, 50 Church St., New York 7, N. Y.

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DELTA WELDER CORPORATION

8525 Livernois • Detroit 4, Michigan

Nonferrous Prices (Effective Oct. 16, 1956)

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. ship. pt., frt. allowed)

Flat Sheet (Mill Finish) and Plate ("F" temper except 6061-0)

Alloy	.032	.081	.136- .249	.250- 3
1800, 1100,				
3003.....	44.3	42.1	40.9	40.2
5052.....	51.8	46.8	45.1	42.9
6061-0.....	48.9	44.6	42.8	42.6

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
6-8.....	45.5-47.3	61.3-65.1
12-14.....	46.2-47.7	62.2-66.8
24-26.....	49.4-49.5	73.1-77.8
36-38.....	58.3-59.0	97.4-101.0

Screw Machine Stock—2011-T-3

Size*	3/4	3/8-3/4	1/2-1	1 1/4-1 1/2
Price	59.7	58.8	57.4	55.2

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length*→	72	96	120	144
.019 gage.....	\$1.352	\$1.803	\$2.254	\$2.704
.024 gage.....	1.686	2.252	2.815	3.378

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type→	Gage→	.250- 3.00	.250- 2.00	.188	.081	.032
AZ31B Stand, Grade		67.9	69.0	77.9	103.1	
AZ31B Spec.		93.3	95.7	108.7	171.3	
Tread Plate		70.6	71.7			
Tooling Plate	73.0					

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade (AZ31C)	69.6	70.7	75.6	89.2
Spec. Grade (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting)..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices, f.o.b. mill)

"A" Nickel	Monel	Inconel
Sheet, CR.....	113	97
Strip, CR.....	111	99
Rod, bar, HR....	94	80
Angles, HR.....	94	80
Plates, HR.....	107	96
Seamless tube...	144	120
Shot, blocks....		78

COPPER, BRASS, BRONZE

(Freight included on 500 lbs)

	Sheet	Wire	Rod	Tube
Copper	61.63			61.82
Brass, 70/30	52.10	52.04		55.01
Brass, Low	55.85	56.39	55.75	58.86
Brass, R L	57.19	57.73	57.13	60.00
Brass, Naval	55.72		50.00	58.88
Muntz Metal	53.84	47.85	49.65	
Comm. Br.	56.08	56.62	56.02	61.64
Mang. Br.	59.46		53.86	
Phos. Br. 5%	79.58		80.08	

TITANIUM

(10,000 lb base, f.o.b. mill)

Sheet and strip, commercially pure, \$12.10-
\$12.60; alloy, \$15.00-\$15.75; Plate, HR, com-
mercially pure, \$10.00-\$10.50; alloy, \$11.50-
\$12.00; Wire, rolled and/or drawn, commerci-
ally pure, \$9.00-\$11.50; alloy, \$11.50; Bar, HR
or forged, commercially pure, \$7.55-\$7.80; alloy,
\$7.55-\$7.75.

PRIMARY METAL

(Cents per lb, unless otherwise noted)

Aluminum ingot, 99+%, 10,000 lb.
freight allowed..... 27.10
Aluminum pig..... 25.00
Antimony, American, Laredo, Tex. 33.50
Beryllium copper, per lb conta'd Be. \$43.00
Beryllium aluminum 5% Be, Dollars
per lb contained Be..... \$74.75
Bismuth, ton lots..... \$ 2.25
Cadmium, del'd..... \$ 1.70
Cobalt, 97-99% (per lb)..... \$2.60 to \$2.67
Copper, electro, Conn. Valley..... 40.00
Copper, Lake, delivered..... 40.00
Gold, U. S. Treas., per troy oz..... \$35.00
Indium, 99.9% dollars per troy oz. \$ 2.25
Iridium, dollars per troy oz. \$90 to \$100
Lead, St. Louis..... 15.80
Lead, New York..... 16.00
Magnesium, 99.8+%, f.o.b. Velasco,
Tex., 10,000 lb, pig..... 35.25
Ingot..... 36.00
Magnesium, sticks, 100 to 500 lb..... 59.00
Mercury, dol'rs per 76-lb flask,
f.o.b. New York..... \$255 to \$257
Nickel electro..... 64.50
Nickel oxide sinter at Copper
Cliff, Ont., contained nickel..... 60.75
Palladium, dollars per troy oz. \$23 to \$24
Platinum, dollars per troy oz. \$103 to \$105
Silver, New York, cents per troy oz. 91
Tin, New York..... 106.75
Titanium sponge, grade A-1, \$2.70 to \$3.00
Zinc, East St. Louis..... 13.50
Zinc, New York..... 14.00
Zirconium sponge..... \$10.00
*Tentative.

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot..... 37.75
No. 115..... 36.50
No. 120..... 35.00
No. 123..... 41.00
80-10-10 ingot..... 39.25
No. 305..... 52.75
No. 315..... 45.50
88-10-2 ingot..... 43.50
No. 210..... 29.75
No. 215..... 33.00
No. 245..... 29.75
Yellow ingot..... 33.00
Manganese bronze..... 33.00
No. 421..... 33.00

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys..... 27.00-27.75
0.30 copper max..... 26.75-27.50
0.60 copper max..... 26.50-27.50
Piston alloys (No. 122 type)..... 25.00-25.50
No. 12 alum. (No. 2 grade)..... 25.00-25.50
108 alloy..... 27.00-28.00
195 alloy..... 26.75-27.50
13 alloy (0.60 copper max.)..... 25.00-25.50
AXS-679..... 25.00-25.50

Steel deoxidizing aluminum, notch bar

granulated or shot
Grade 1—95-97 1/2%..... 25.00-26.00
Grade 2—92-95%..... 24.00-25.00
Grade 3—90-92%..... 23.50-24.50
Grade 4—85-90%..... 23.00-23.50

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for
shipments of 20,000 lb and over)

	Heavy	Turnings
Copper.....	36	35 1/2
Yellow brass.....	27 1/2	25 1/2
Red brass.....	31 1/2	31 1/2
Comm. bronze.....	33 1/2	32 1/2
Mang. bronze.....	25 1/2	24 1/2
Yellow brass rod ends	37	....

Customs Smelters Scrap

(Cents per pound carload lots, delivered
to refinery)

No. 1 copper wire.....	31 1/2
No. 2 copper wire.....	30 1/2
Light copper.....	28
*Refinery brass.....	28 1/2
*Dry copper content.	

Ingot Makers Scrap

(Cents per pound carload lots, delivered
to refinery)

No. 1 copper wire.....	31 1/2
No. 2 copper wire.....	30 1/2
Light copper.....	28
No. 1 composition.....	30
No. 1 comp. turnings.....	29 1/2
Hvy. yellow brass solids.....	21
Brass pipe.....	21 1/2
Radiators.....	23 1/2

Aluminum

Mixed old cast.....	16 1/2-17 1/2
Mixed new clips.....	17 1/2-18 1/2
Mixed turnings, dry.....	16 1/2-17 1/2

Dealers' Scrap

(Dealers' buying price, f.o.b. New York
in cents per pound)

Copper and Brass

No. 1 copper wire.....	29 1/2-30
No. 2 copper wire.....	27 1/2-28
Light copper.....	25 1/2-28 1/2
Auto radiators (unsweated).....	19-19 1/2
No. 1 composition.....	25 1/2-26
No. 1 composition turnings.....	24-24 1/2
Cocks and faucets.....	19-19 1/2
Clean heavy yellow brass.....	17-17 1/2
Brass pipe.....	20 1/2-21
New soft brass clippings.....	22-22 1/2
No. 1 brass rod turnings.....	19 1/2-20 1/2

Aluminum

Alum. pistons and struts.....	7 1/2-8
Aluminum cranks.....	12 1/2-13
1100 (2S) aluminum clippings.....	15 1/2-16
Old sheet and utensils.....	12 1/2-13
Borings and turnings.....	9-9 1/2
Industrial castings.....	12 1/2-13
2024 (24S) clippings.....	14-14 1/2

Zinc

New zinc clippings.....	7-7 1/2
Old zinc.....	4 1/2-5
Zinc routings.....	2 1/2-3
Old die cast scrap.....	2 1/2-2 3/4

Nickel and Monel

Pure nickel clippings.....	\$1.85-\$1.95
Clean nickel turnings.....	\$1.55-\$1.65
Nickel anodes.....	\$1.85-\$1.95
Nickel rod ends.....	\$1.85-\$1.95
New Monel clippings.....	70-80
Clean Monel turnings.....	70-80
Old sheet Monel.....	70-80
Nickel silver clippings, mixed.....	21
Nickel silver turnings, mixed.....	18

Lead

Soft scrap lead.....	12 1/2-13
Battery plates (dry).....	7-7 1/2
Batteries, acid free.....	4 1/2

Miscellaneous

Block tin.....	80-81
No. 1 pewter.....	62 1/2-63
Auto babbitt.....	42-42 1/2
Mixed common babbitt.....	13-13 1/2
Solder joints.....	18-18 1/2
Siphon tops.....	42
Small foundry type.....	15 1/2-15 3/4
Monotype.....	14 1/2-15
Lino. and stereotype.....	13-13 1/2
Electrotype.....	12 1/2-12 3/4
Hand picked type shells.....	10-10 1/2
Lino. and stereo. dross.....	5 1/2-5 3/4
Electro. dross.....	4 1/2-4 3/4

IRON AGE

STEEL
PRICES(Effective
Oct. 16, 1956)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PIL- ING	SHAPES STRUCTURALS			STRIP					
		Carbon Revolving Net Ton	Carbon Fencing Net Ton	Alloy Net Ton		Carbon	Hi Str. Low Alloy	Carbon Wide- Flange	Hot- rolled	Cold- rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot- rolled	Alloy Cold- rolled
EAST	Beidchem, Pa.			\$107.00 B3		5.85 B3	7.40 B3	5.85 B3						
	Buffalo, N. Y.	\$74.00 B3, R3	\$91.50 B3, R3	\$107.00 B3, R3	5.90 B3	5.85 B3	7.40 B3	5.85 B3	4.875 B3, R3	6.95 R7	6.95 B3			
	Claymont, Del.													
	Harrison, N. J.													14.55 C7I
	Conshohocken, Pa.		\$96.50 A2	\$114.00 A2					5.725 A3	8.90 A2	6.95 A2			
	New Bedford, Mass.									7.90 R8				
	Johnstown, Pa.	\$74.00 B3	\$91.50 B3	\$107.00 B3		5.85 B3	7.40 B3							
	Boston, Mass.									7.40 T8				14.90 T8
	New Haven, Conn.									7.30 D1				
	Baltimore, Md.									6.85 T8				
	Phoenixville, Pa.					5.85 P2		5.85 P2						
	Sparrows Pt., Md.								4.875 B3		6.95 B3			
	Bridgeport, Wallingford, Conn.	\$79.00 N8	\$96.50 N8	\$107.00 N8						7.30 W1 6.95 T8				
	Pawtucket, R. I. Worcester, Mass.									7.40 A3,N7				14.90 N7
MIDDLE WEST	Alton, Ill.								4.875 L1					
	Ashland, Ky.								4.875 A7					
	Canton-Massillon, Dover, Ohio		\$94.00 R3	\$107.00 R3 T3						6.85 G4		10.10 G4		14.55 G4
	Chicago, Ill. Franklin Park, Ill.	\$74.00 U1, R3	\$91.50 U1, R3,W8	\$107.00 U1, R3,W8	5.90 U1	5.80 U1, W8	7.35 U1, Y1 6.80 W8	5.80 U1	4.875 N4 4.875 A1	6.95 A1,T8			7.75 W8, S9	14.55 A1, S9,T8
	Cleveland, Ohio									6.85 A3,J3			7.75 J3	
	Detroit, Mich.	\$74.00 R5		\$107.00 R5					4.775 G3, M3	6.95 M2,G3, D1,P11	7.85 G3	10.10 G3, S1,D2	7.85 G3	
	Anderson, Ind.									6.85 G4		10.10 G4		
	Duluth, Minn.													
	Gary, Ind. Harbor, Indiana	\$74.00 U1	\$91.50 U1	\$107.00 U1, Y1	5.90 J3	5.80 U1	7.35 U1,J3	5.80 J3	4.875 U1, J3,Y1	6.85 Y1	6.95 U1, J3,Y1	10.20 Y1	7.75 U1, Y1	
	Sterling, Ill.	\$74.00 N4							4.775 N4					
	Indianapolis, Ind.									7.90 C9				
	Newport, Ky.												7.75 N5	
	Middletown, Ohio													
	Niles, Warren, Ohio Sharon, Pa.		\$91.50 S1, C10	\$107.00 S1 C10					4.875 S1, R3	6.85 T4	6.95 S1, R3	10.00 S1, R3	7.75 S1	14.55 S1
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	\$74.00 U1, J3	\$91.50 U1, J3,C11	\$107.00 U1, C11	5.90 U1	5.80 U1, J3	7.35 U1, J3	5.80 U1	4.875 P8	6.750 P8 6.85 J3,S4, S7			7.75 S9	14.55 S9
	Parsons, Ohio													
	Watson, Wheeling, Fallsburg, W. Va.					5.80 W3			4.875 W3	6.85 W3,P3	6.95 W3	8.85 W3		
	Youngstown, Ohio	\$74.00 R3	\$91.50 Y1, C10	\$107.00 Y1		5.80 Y1	7.35 Y1		4.875 U1, Y1	6.85 Y1,C3	6.95 U1, Y1	10.20 Y1	7.75 U1, Y1	
WEST	Fontana, Cal.	\$83.50 K1	\$101.00 K1	\$128.00 K1		5.70 K1	6.85 K1	5.85 K1	4.875 K1	6.80 K1				
	Genova, Utah	\$91.50 C7				5.80 C7	7.35 C7							
	Kansas City, Mo.					5.10 S2	7.45 S2		4.925 S3			7.30 S3		
	Los Angeles, Torrance, Cal.		\$101.00 B2	\$127.00 B2		5.70 C7, B2	6.85 B2		4.825 B3 C7	6.80 C1			6.95 B2	
	Minneapolis, Minn.					5.30 C6			4.775 C9					
	Portland, Ore.					5.75 O2								
	San Francisco, Niles, Pittsburg, Cal.		\$101.00 B2			5.65 B2	6.80 B2		4.825 C7,B3					
	Seattle, Wash.		\$105.00 B2			5.75 B2	6.10 B2		4.875 B3					
	Atlanta, Ga.								4.875 A8					
SOUTH	Fairfield, Ala. City, Birmingham, Ala.	\$74.00 T2	\$91.50 T2			5.80 T2,R3 5.30 C76	7.35 T2		4.875 T2,R3 4.975 C76		6.95 T2			
	Houston, Lone Star, Texas	\$80.00 L3	\$96.50 S2	\$112.00 S2		5.10 S2	7.45 S2		4.925 S2		7.30 S3			

**STEEL
PRICES**(Effective
Oct. 16, 1956)

EAST

Baltimore, Pa.

Buffalo, N. Y.

Claymont, Del.

Coatesville, Pa.

Couschocton, Pa.

Harrisburg, Pa.

Hartford, Conn.

Johnstown, Pa.

Fairless, Pa.

New Haven, Conn.

Phoenixville, Pa.

Sparrows Pt., Md.

Worcester, Mass.

Trenton, N. J.

Alien, Ill.

Ashland, Ky.

Canton-Macellon,
Dover, Ohio

Chicago, Joliet, Ill.

Sterling, Ill.

Cleveland, Ohio

Detroit, Mich.

Newport, Ky.

Gary, Ind. Harbor,
Indiana

Granite City, Ill.

Kokomo, Ind.

Mansfield, Ohio

Middletown, Ohio

Niles, Warren, Ohio

Sharon, Pa.

Pittsburgh, Pa.

Midland, Pa.

Butler, Pa.

Portsmouth, Ohio

Wornton, Wheeling,
Follansbee, W. Va.

Youngstown, Ohio

Fontana, Cal.

Geneva, Utah

Kansas City, Mo.

Los Angeles,
Torrance, Cal.

Minneapolis, Colo.

San Francisco, Niles,
Pittsburg, Cal.

Seattle, Wash.

Atlanta, Ga.

Fairfield, Ala.

Alabama City, Ala.

Houston, Tex.

SHEETS**WIRE
ROD****TINPLATE†****BLACK
PLATE**Hot-rolled
18 ga.
& heavier.Cold-
rolled

Galvanized

Enamel-
ingLong
TensileHi Str.
Low Alloy
H.R.Hi Str.
Low Alloy
C.R.Hi Str.
Low Alloy
Galv.Hot-rolled
19 ga.Cokes*
1.25-lb.
base boxElectro*
0.25-lb.
base boxHolloware
Enameling
29 ga.

† Special coated mfg.
terms deduct 50¢ from
1.25-lb. cokes base box
price. Can-making quality
blackplate 55 to 128 lb.
deduct \$2.20 from 1.25 lb.
cokes base box.
* COKES: 1.50-lb.
add 25¢.
ELECTRO: 0.50-lb. add
25¢; 0.75-lb. add 65¢;
1.00-lb. add \$1.00. Differ-
ential 1.00 lb./0.25 lb.
add 65¢.

MIDDLE WEST

WEST

SOUTH

IRON AGE

STEEL
PRICES(Effective
Oct. 18, 1956)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

STEEL PRICES (Effective Oct. 16, 1956)		BARS					PLATES				WIRE	
		Carbon Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mir's. Bright
EAST	Bethlehem				6.125 B3	8.325 B3	7.40 B3					
	Buffalo, N. Y.	5.075 B3,R3	5.075 B3,R3	6.90 B5	6.125 B3,R3	8.325 B5,B3	7.40 B3	4.85 B3				7.20 W6
	Claymont, Del.							5.35 C4		6.85 C4	7.55 C4	
	Coatesville, Pa.							5.25 L4		6.85 L4	7.55 L4	
	Coshocton, Pa.							4.90 A2	5.925 A2	6.25 A2	7.25 A2	
	Harrisburg, Pa.							5.80 P2	6.275 C3			
	Hartford, Conn.			7.35 R3		6.625 R3	7.40 B3					
	Johnstown, Pa.	5.075 B3	5.075 B3		6.125 B3			4.85 B3		6.85 B3	7.25 B3	7.20 B3
	Fairless, Pa.	5.225 U1	5.225 U1		6.275 U1							
	Newark, N. J.			7.30 W10		8.50 W10						
	Camden, N. J.			7.30 P10		8.50 P10						
	Bridgeport, Conn.	5.30 N8	5.30 N8	7.20 N8 7.40 W10	6.20 N8	8.475 N8	7.50 N8					
	Sparrows Pt., Md.		5.075 B3					4.85 B3		6.85 B3	6.85 B3	7.30 B3
	Palmer, Worcester, Roadville, Mass. Milton, Pa.	5.325 M7	5.225 M7	7.40 B5,C14		8.325 A5 8.625 B5						7.50 A5,W6 9.825 T8
	Spring City, Pa.			7.30 K4		8.50 K4						
MIDDLE WEST	Alton, Ill.	5.275 L1										7.40 L1
	Ashland,Newport,Ky.							4.85 A7,N5		6.85 N5		
	Canton-Massillon, Ohio			6.85 R3,R2	6.125 R3,T5	8.325 R3,R2,T5						
	Chicago, Joliet, Ill.	5.075 U1,R3, W8,N4 5.575 P13	5.075 U1,R3, N4 5.575 P13	6.85 A5,B5, W10,L2, W8,L2,N9	6.125 U1,R3, W8	8.325 A5,B5, W8,L2,N9, W10	5.875 W8	4.85 U1,I3, W8,A1	5.925 U1	6.85 U1,W8	7.25 U1	7.20 A5,K2, R3,N4,W7
	Cleveland, Ohio	5.075 R3	5.075 R3	6.85 A5,C13		8.325 A5,C13	7.425 R3	4.95 J3,R3	5.925 J3		7.25 J3,R3	7.20 A5, C13
	Detroit, Mich.	5.175 G3	5.425 G3	7.05 B5,P8 7.10 P3 6.85 R5	6.225 G3 6.125 R5	8.525 B5,P3, P8 8.325 R5	7.525 G3	4.95 G3		6.90 G3		
	Duluth, Minn.											7.20 A5
	Gary, Ind. Harbor, Crawfordsville	5.075 U1,I3, Y1	5.075 U1,I3, Y1	6.85 R3,M5	6.125 U1,I3, Y1	8.325 R3,M4	7.425 U1,I3, Y1	4.85 U1,I3, Y1	5.925 I3	6.85 U1,Y1	7.25 U1,Y1	7.30 M4
	Granite City, Ill.							5.05 G2				
	Kokomo, Ind.											7.30 C9
	Sterling, Ill.	5.525 N4	5.175 N4									7.30 K2
	Niles, Warren, Ohio Sharon, Pa.			6.85 C11	6.125 C10,S1	8.325 C10	7.425 S1	4.85 S1,R3		6.85 S1	7.25 S1,R3	
	Pittsburgh, Pa. Midland, Pa.	5.075 U1, C11,J3	5.075 U1,J3	6.85 A5,C8, C11,J3,R3, S9,B4,W10	6.125 U1,C11	8.325 A5,R3, S9,C8,W10	7.425 U1,J3	4.85 U1,J3	5.925 U1	6.85 U1,J3	7.25 U1,J3	7.20 A5,J3, P6
	Portsmouth, Ohio											7.20 P7
	Weirton, Wheeling, Follansbee, W. Va.							4.85 W5				
	Youngstown, Ohio	5.075 U1, Y1,R3	5.075 U1, Y1,R3	6.85 U1,Y1, F2	6.125 U1,Y1	8.325 Y1,F2	7.425 U1,Y1	4.85 U1,Y1, R3		6.85 Y1	7.25 Y1	7.20 Y1
WEST	Emeryville, Cal.	5.825 J5	5.825 J5									
	Fontana, Cal.	5.775 K1	5.775 K1		7.175 K1		8.125 K1	5.55 K1		7.55 K1	7.95 K1	
	Geary, Utah	5.175 C7						4.85 C7			7.25 C7	
	Kansas City, Mo.	5.325 S2	5.325 S2		6.375 S2		7.675 S2					7.45 S2
	Los Angeles, Torrance, Cal.	5.775 C7,B2	5.775 C7,B2	8.30 R3	7.175 B2		8.125 B2					8.15 B2
	Minneapolis, Colo.	5.525 C6	5.525 C6					5.70 C6				7.45 C6
	Portland, Ore.	5.825 O2	5.825 O2									
	San Francisco, Niles, Pittsburg, Cal.	5.775 C7,P9 5.825 B2	5.775 C7,P9 5.825 B2				8.175 B2					8.15 C7,C6
	Seattle, Wash.	5.825 B2 5.825 N6	5.825 B2				8.175 B2	5.75 B2		7.75 B2	8.15 B2	
	Atlanta, Ga.	5.575 A8										7.40 A8
SOUTH	Fairfield, Ala. City, Birmingham, Ala.	5.075 T2, R3 5.375 C16	5.075 T2, R3 5.375 C16				7.425 T2	4.85 T2, R3			7.25 T2	7.20 T2,R3
	Houston, Ft. Worth, Lane Star, Tex.	5.325 S2	5.325 S2		6.375 S2		7.675 S2	4.95 S2 5.20 L3		6.95 S2	7.35 S2	7.45 S2

Steel Prices (Effective Oct. 16, 1956)

Key to Steel Producers

With Principal Offices

- A1** Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Combeflores, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Clad Metals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angell Nail & Chaplet Co., Cleveland
A7 Armac Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brook Plant, Wickwire Spencer Steel Div., Birdsboro, Pa.
C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C3 Central Iron & Steel Co., Harrisburg, Pa.
C4 Claymont Products Dept., Claymont, Del.
C5 Cold Metals Products Co., Youngstown, O.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shifting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C12 Cumberland Steel Co., Cumberland, Md.
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shifting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C17 Chester Blast Furnace, Inc., Chester, Pa.
D1 Detroit Steel Corp., Detroit
D2 Detroit Tube & Steel Div., Detroit
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.
D5 Henry Diston Div., Philadelphia
E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Steel Co., Mansfield, O.
F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

- G2** Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
H1 Hanna Furnace Corp., Detroit
I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland
J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.
K1 Kaiser Steel Corp., Fontana, Cal.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.
K4 Keystone Drawn Steel Co., Spring City, Pa.
L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.
M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid-States Steel & Wire Co., Crawfordsville, Ind.
M5 Monarch Steel Div., Hammond, Ind.
M6 Mystic Iron Works, Everett, Mass.
M7 Milton Steel Products Div., Milton, Pa.
N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N3 Niles Rolling Mill Div., Niles, O.
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N5 Newport Steel Corp., Newport, Ky.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Northeastern Steel Corp., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.
O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland
P1 Page Steel & Wire Div., Menomense, Pa.
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phomix Mfg. Co., Joliet, Ill.
R1 Reeves Steel & Mfg. Co., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebbing Sons Co., John A., Trenton, N. J.
R5 Rotary Electric Steel Co., Detroit
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.
S1 Dearborn Div., Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S6 Standard Forging Corp., Chicago
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Corp., Carnegie, Pa.
S10 Seneca Steel Service, Buffalo
T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston
U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham
W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.
Y1 Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING

Base discounts (pts) l.o.b. mills. Base price about \$200 per net ton.

	BUTTWELD												SEAMLESS											
	1/2 In.		3/4 In.		1 In.		1 1/4 In.		1 1/2 In.		2 In.		2 1/2 In.		3 In.		3 1/2 In.		4 In.		4 1/2 In.		5 In.	
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
STANDARD T. & C.																								
Sparrows Pt. B3	18.50	+4.75	13.50	+0.75	16.00	2.75	18.50	3.50	19.00	4.50	19.50	5.00	21.00	4.75										
Youngstown R3	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75										
Fentona K1	9.00	+15.25	3.00	+11.25	5.50	+7.75	8.00	+7.00	8.50	+6.00	9.00	+5.50	10.50	+5.75										
Pittsburgh J3	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75										
Alton, Ill. L1	18.50	+4.75	13.50	+0.75	16.00	2.75	18.50	3.50	19.00	4.50	19.50	5.00	21.00	4.75										
Sharon M3	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75										
Fairless N2	18.50	+4.75	13.50	+0.75	16.00	2.75	18.50	3.50	19.00	4.50	19.50	5.00	21.00	4.75										
Pittsburgh N1	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75										
Wheeling W5	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75										
Wheatland W6	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75										
Youngstown Y1	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75										
Indiana Harbor Y1	11.50	+5.75	14.50	1.25	17.00	3.75	19.50	4.50	20.00	5.50	20.50	6.00	22.00	5.75										
Lorain N2	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75										
EXTRA STRONG PLAIN ENDS																								
Sparrows Pt. B3	15.00	1.25	19.00	5.25	21.00	8.75	21.50	7.50	22.00	8.50	22.50	9.00	23.00	7.75										
Youngstown R3	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75										
Fairless N2	15.00	1.25	19.00	5.25	21.00	8.75	21.50	7.50	22.00	8.50	22.50	9.00	23.00	7.75										
Fentona K1	4.50		8.50		11.00	10.50	11.00	9.75	11.50	10.50	12.00	11.00	12.50	11.00										
Pittsburgh J3	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75										
Alton, Ill. L1	15.00	1.25	19.00	5.25	21.00	8.75	21.50	7.50	22.00	8.50	22.50	9.00	23.00	7.75										
Sharon M3	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75										
Pittsburgh N1	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75										
Wheeling W5	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75										
Wheatland W6	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75										
Youngstown Y1	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75										
Indiana Harbor Y1	16.00	2.25	20.00	6.25	22.00	9.75	22.50	8.50	23.00	9.50	23.50	10.00	24.00	8.75										
Lorain N2	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75										

Threads only, butt weld and seamless 2 1/4 pt. higher discount. Plain ends, butt weld and seamless, 3-in. and under, 5 1/2 pt. higher discount. Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: 1/2, 3/4 and 1-in., 2 pt.; 1 1/4, 1 1/2 and 2-in., 1 1/2 pt.; 2 1/2 and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2 1/2" and 3" pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price new 13.50¢ per lb.

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	\$1.68	T-1
18	4	1	—	5	2.385	T-4
18	4	2	—	—	1.845	T-2
1.5	4	1.5	8	—	1.04	M-1
6	4	3	6	—	1.43	M-3
6	4	2	5	—	1.185	M-2

High-carbon chromium... .83 D-3, D-5
Oil hardened manganese... .45 O-2
Special carbon... .41 W-1
Extra carbon... .345 W-1
Regular carbon... .29 W-1
Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

CLAD STEEL

Base prices, cents per lb. f.o.b.

Cladding	Plate (A3, J2, L4)			Sheet (J2)	
	10 pct	15 pct	20 pct	20 pct	
304	34.60	38.00	41.50		
316	39.70	43.20	46.65		
321	36.35	39.80	43.50		
347	39.50	43.95	48.45		
405	29.20	33.15	37.05		
410, 430	28.70	32.65	36.55		

CR Strip (S9) Copper, 10 pct, 2 sides, 41.40; 1 side, 33.60.

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length)	
		Semi-Processed	Fully Processed
Field.....	9.00	9.20	
Armature.....	10.35	10.35	10.85
Elect.....	11.00	11.025	11.525
Meter.....	12.05	12.075	12.575
Dynamo.....	13.05	13.05	13.55
Trans. 72.....	14.05	14.05	14.55
Trans. 65.....	14.00		
Grain Oriented			
Trans. 58.....	15.10	Trans. 58.....	18.50
Trans. 52.....	16.15	Trans. 73.....	19.00

Producing plants: Beach Bottom (W5); Brackenridge (A3); Granite City (G7); Indiana Harbor (J3); Mansfield (E2); Newport, Ky. (N5); Niles, O. (N3); Vandergrift (U); Warren, O. (R5) (20¢ higher, HR); Zanesville, Butler (A7).

LAKE SUPERIOR ORES

51.50% Fe natural content, delivered lower Lake ports. Prices for 1956 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump.....	\$12.10
Old range, bessemer.....	11.25
Old range, nonbessemer.....	11.10
Menabi, bessemer.....	11.00
Menabi, nonbessemer.....	10.85
High phosphorus.....	10.85

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard Q Coated Nails		Woven Wire Fence 9-15 1/2 ga.		1/2" Fence Posts		Single Loop Bale Ties		Galv. Barbed and Twisted Barbed Wire		Merch. Wire Ann'd		Merch. Wire Galv.	
	Cal	Cal	Cal	Cal	Cal	Cal	Cal	Cal	Cal	Cal	Cal	Cal	Cal	Cal
Alabama City R3.....	167	181	195	187	8.10	8.50								
Altoona, Pa. J3.....	167	184	195	184	8.10	8.45								
Atlanta A5.....	169	187	197	193	8.20	8.60								
Barrenville R2.....	169	187	197	193	8.20	8.60								
Buffalo W6.....	167	185	195	191	8.10	8.50								
Chicago, Ill. N4**.....	167	185	195	191	8.10	8.70								
Cleveland A6.....	173	187	195	191	8.10	8.50								
Cleveland A5.....	169	187	195	191	8.10	8.50								
Crawfordsville M4.....	169	187	195	191	8.10	8.50								
Ducora, Pa. A5.....	164	176	190	184	7.95	8.35								
Duluth A5.....	164	176	190	184	7.95	8.35								
Fairfield, Ala. T2.....	164	176	190	184	7.95	8.35								
Galveston D4.....	169	187	195	191	8.10	8.50								
Houston S2.....	172	186	200	192	8.35	8.75								
Johnstown, Pa. B3.....	167	185	195	191	8.10	8.70								
Joliet, Ill. A5.....	164	176	190	184	7.95	8.35								
Kokomo, Ind. C9.....	169	183	197	189	8.20	8.60								
Los Angeles B2.....	172	186	200	192	8.35	8.75								
Kansas City S2.....	172	186	200	192	8.35	8.75								
Minneapolis C6.....	172	186	200	192	8.35	8.75								
Monessen P6.....	167	185	195	191	8.10	8.50								
Pittsburg, Cal. C7.....	164	176	190	184	7.95	8.35								
Portsmouth P7.....	164	176	190	184	7.95	8.35								
Rankin, Pa. A5.....	167	181	195	187	8.10	8.50								
S. Chicago R3.....	167	181	195	187	8.10	8.50								
S. San Francisco C6.....	167	181	195	187	8.10	8.50								
Spartan, Pa. B3.....	167	181	195	187	8.10	8.50								
Struthers, O. Y1.....	170	184	198	194	8.20	8.60								
Worcester A5.....	170	184	198	194	8.20	8.60								
Williamsport, Pa. S5.....	175	189	203	199	8.35	8.75								

Galvanized products computed with zinc at 5¢ per lb. Exceptions: * zinc at 12.5¢ per lb; ** 13 1/2¢ zinc.

†—Wholesalers only.

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT				
	0.26-0.40	0.41-0.60	0.61-0.80	0.81-1.05	1.06-1.35
Baltimore, Md. T8.....	8.25	10.10	12.90	15.30	18.25
Bristol, Conn. W12.....	8.25	10.10	12.90	15.30	18.25
Boston T8.....	8.50	10.10	12.90	15.30	18.25
Buffalo, N. Y. R7.....	7.95	9.80	12.60	15.00	17.95
Carnegie, Pa. S9.....	7.95	9.80	12.60	15.00	17.95
Cleveland A5.....	7.95	9.80	12.60	15.00	17.95
Detroit D1.....	8.05	9.90	12.70	15.10	18.05
Detroit D2.....	8.05	9.90	12.70	15.10	18.05
Deer, O. G4.....	7.95	9.80	12.60	15.00	17.95
Franklin Park, Ill. T8.....	8.05	9.90	12.60	15.00	17.95
Harrison, N. J. C11.....	8.10	9.90	12.60	15.00	17.95
Indianapolis C3.....	8.10	9.90	12.60	15.00	17.95
New Castle, Pa. B4.....	7.95	9.80	12.60	15.00	17.95
New Haven, Conn. D1.....	8.40	10.10	12.90	15.30	18.25
Pawtucket, R. I. N7.....	8.50	10.10	12.90	15.30	18.25
Pittsburg S7.....	7.95	9.80	12.60	15.00	17.95
Riverdale, Ill. A1.....	8.05	9.90	12.60	15.00	17.95
Sharon, Pa. S1.....	7.95	9.80	12.60	15.00	17.95
Trenton R4.....	10.10	12.90	15.30	18.25	21.15
Wallingford W1.....	8.40	10.10	12.90	15.30	18.25
Warren, Ohio T4.....	7.95	9.80	12.60	15.00	17.95
Weirton, W. Va. W3.....	7.95	9.80	12.60	15.00	17.95
Worcester, Mass. A5.....	8.50	10.10	12.90	15.30	18.25
Youngstown C5.....	7.95	9.80	12.60	15.00	17.95

† On Application.

BOILER TUBES

Size	Seamless		Elec. Weld	
	OD-In.	B.W. Ga.	H.R.	C.D.
3 per 100 ft. carload lots, cut to 24 ft. F.o.b. Mill				
Babcock & Wilcox.....	2	13	34.88	40.85
	2 1/2	12	46.98	55.01
	3	12	54.24	63.53
	3 1/2	11	63.32	74.16
	4	10	84.09	98.47
National Tube.....	2	13	34.88	40.85
	2 1/2	12	46.98	55.01
	3	12	54.24	63.53
	3 1/2	11	63.32	74.16
	4	10	84.09	98.47
Pittsburgh Steel.....	2	13	34.88	40.85
	2 1/2	12	46.98	55.01
	3	12	54.24	63.53
	3 1/2	11	63.32	74.16
	4	10	84.09	98.47

WARE-HOUSES

Metropolitan Price, dollars per 100 lb.

WAKE- HOUSES		Sheets			Strip		Plates	Shapes	Bars		Alloy Bars			
Cities	City Delivery & Charge	Hot-Rolled 10 ga. & hvy.	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold- Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta.....		8.07	9.27	9.83	8.16		8.40	8.44	8.30	10.14				
Baltimore.....	\$.10	7.79	9.54	9.12	8.27		8.12	8.57	8.34	9.09	14.99	14.44	18.39	18.09
Birmingham.....	.15	7.68	8.88	8.85	7.78		8.01	8.05	7.91	10.04				
Boston.....	.10	8.70	9.73	11.12	8.79		8.98	8.90	8.88	10.71	15.05	14.45	18.51	18.10
Buffalo.....	.15	8.80	9.83		8.89		9.08	9.00	8.98	10.81				
		7.90	9.05	10.87	8.15		8.40	8.40	8.15	8.85	15.00	14.45	18.40	
Chicago.....	.15	7.70	8.88	9.85	7.78		8.01	8.05	7.91	8.35	14.65	14.10	18.05	17.75
Cincinnati.....	.15	7.85	9.05		7.93		8.16	8.20	8.06	8.50				
		7.97	9.04	9.90	8.21		8.49	8.70	8.34	8.97	14.93	14.38	18.33	18.03
Cleveland.....	.15	7.83	9.03	9.75	8.03		8.36	8.53	8.14	8.75	14.73	14.18	18.13	17.83
Denver.....		9.55	11.09	12.41	9.70		9.80	9.60	9.75	10.54				19.79
Detroit.....	.15	8.06	9.28	10.17	8.25		8.48	8.70	8.33	8.83		14.04		17.09
Houston.....		8.70	9.65		8.80		8.60	8.90	8.95	10.55	15.50		19.30	19.05
Kansas City.....	.20	8.52	9.72	10.07	8.60		8.83	8.87	8.73	9.42	15.32	14.77	18.72	18.42
Los Angeles.....	.10	9.00	10.75	11.75	9.20		9.45	9.05	8.90	11.80	15.85	15.35	19.70	19.45
Memphis.....	.15	8.02	9.22		8.12		8.35	8.39	8.25	9.05				
Milwaukee.....	.15	7.97	9.17	9.97	8.05		8.53	8.39	8.18	8.72	14.77		18.17	17.87
New York.....	.10	8.45	9.63	10.33	8.91		8.88	8.84	8.93	10.71	15.02	14.47	18.42	18.12
Norfolk.....	.20	8.00			8.40		8.35	8.70	8.45	10.70				
Philadelphia.....	.10	7.80	9.08	9.66	8.50		8.28	8.38	8.37	9.12	14.80	14.15	18.20	17.90
		7.99	9.18	10.22	8.68		8.38	8.48	8.47	9.22		14.25		
Pittsburgh.....	.15	7.83	9.03	10.20	8.03**		8.16	8.20	8.06	8.75	14.65	13.80	18.05	16.85
												15.00	18.05	17.75
Portland.....		8.90	9.65	11.40	9.05		8.70	8.90	8.95	13.55	16.70	16.10	20.40	20.25
San Francisco.....	.10	8.85	10.40	10.90	9.05		8.95	8.95	8.90	12.40	15.85	15.35	19.70	19.45
Seattle.....		9.35	11.20	11.55	9.50		9.05	9.15	9.30	13.15	16.10	15.55	19.50	19.20
St. Louis.....	.15	8.02	9.16	10.03	8.11		8.34	8.48	8.25	8.93	14.83	14.28	18.23	17.93
		8.17	9.36	10.18	8.26		8.49	8.63	8.40	9.08	14.98		18.38	
St. Paul.....	.15	8.44	9.64	10.48	8.54		8.86	8.90	8.67	9.36		14.62		18.22

RAILS, TRACK SUPPLIES

F. & B. Mill Cents Per Lb.	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Scow Spikes	Tie Plates	Track Bolts Unthreaded
Bessemer UI...	5.075	6.00	6.35	.....	.....	.....	.....
Se. Chicago R3...	5.075	6.00	6.35	.....	.....	.....	.....
Easley T2...	5.075	6.00	6.35	.....	.....	.....	.....
Fairfield T2...	5.075	6.00	6.35	.....	.....	.....	.....
Gary UI...	5.075	6.00	6.35	.....	.....	.....	.....
Ind. Harbor J3...	5.075	6.00	6.35	.....	.....	.....	.....
Ind. Harbor Y1...	5.075	6.00	6.35	.....	.....	.....	.....
Johnstown B3...	5.075	6.00	6.35	.....	.....	.....	.....
Jefferson UI...	5.075	6.00	6.35	.....	.....	.....	.....
Kansas City S2...	5.075	6.00	6.35	.....	.....	.....	.....
Lackawanna B3...	5.075	6.00	6.35	.....	.....	.....	.....
Lebanon B3...	5.075	6.00	6.35	.....	.....	.....	.....
Minneapolis C6...	5.075	6.00	6.35	.....	.....	.....	.....
Pittsburgh P5...	5.075	6.00	6.35	.....	.....	.....	.....
Pittsburgh J3...	5.075	6.00	6.35	.....	.....	.....	.....
Seattle B2...	5.075	6.00	6.35	.....	.....	.....	.....
Stedion B3...	5.075	6.00	6.35	.....	.....	.....	.....
Strablers Y1...	5.075	6.00	6.35	.....	.....	.....	.....
Terrace C7...	5.075	6.00	6.35	.....	.....	.....	.....
Williamsport S3...	5.075	6.00	6.35	.....	.....	.....	.....
Youngstown R3...	5.075	6.00	6.35	.....	.....	.....	.....

COKE

Furnace, beehive (f.o.b. oven) Net-Ton
Connellsville, Pa. \$14.50 to \$14.75
Foundry, beehive (f.o.b. oven) \$17.00 to \$18.00

Foundry, oven coke	
Buffalo, del'd	\$20.75
Detroit, f.o.b.	29.50
New England, del'd	30.55
Seaboard, N. J., f.o.b.	28.75
Philadelphia, f.o.b.	28.50
Swedenland, Pa., f.o.b.	28.50
Painesville, Ohio, f.o.b.	29.50
Elia, Pa., f.o.b.	29.50
Cleveland, del'd	31.55
Cincinnati, del'd	28.59
St. Paul, f.o.b.	28.50
St. Louis, f.o.b.	30.50
Birmingham, f.o.b.	27.60
Milwaukee, f.o.b.	29.50
Lone Star, f.o.b.	25.50

ELECTRODES

Cents per lb f.o.b. plant, threaded, with
nipples, unboxed.

GRAPHITE			CARBON*		
Diam. (In.)	Length (In.)	Price	Diam. (In.)	Length (In.)	Price
24	84	24.75	40	100, 110	10.70
20	72	24.00	35	110	10.70
18 to 18	72	24.50	30	110	10.85
14	72	25.00	24	72 to 84	11.25
12	72	25.50	20	90	11.00
10	60	26.50	17	72	11.40
10	48	27.00	14	72	11.85
7	60	26.75	12	60	12.95
6	60	30.00	10	60	13.00
4	40	33.25	8	60	13.30
3	40	33.25			
2 1/2	30	37.25			
2	24	57.75			

* Prices shown cover carbon nipples.

ELECTROPLATING SUPPLIES

Anodes	
(Cents per lb, fct allowed in quantity)	
Copper	
Cast elliptical, 18 in. or longer,	
5000 lb lots	62.93
Electrodeposited	60.13
Brass, 80-20, ball anodes, 2000 lb	
or more	60.00
Zinc, ball anodes, 2000 lb lots	31.25
(for elliptical add 2¢ per lb)	
Nickel, 99 pct plus, rolled carbon	90.50
(rolled depolarized add 3¢ per lb)	
Cadmium	11.70
Tin, ball anodes and elliptical	\$1.06 to \$1.10
Chemicals	
(Cents per lb, f.o.b. shipping point)	
Copper cyanide, 100 lb drum	80.50
Copper sulphate, 5 or more 100 lb	
bags, per cwt	27.15
Nickel salts, single, 4-100 lb bags	33.25
Nickel chloride, freight allowed,	
100 lb	46.50
Sodium cyanide, domestic, f.o.b.	
N. Y., 200 lb drums	22.35
(Philadelphia price \$2.60)	
Zinc cyanide, 100 to 900 lb	55.55
Potassium cyanide, 100 lb drum	
N. Y.	48.00
Chromic acid, flake type, 1 to 20	
100 lb drums	39.25

BOLTS, NUTS, RIVETS, SCREWS

(Base discount, f.o.b. mill)

Flat Discount

Machine and Carriage Bolts	Full Container Price	30 Containers	20,000 Lb.	40,000 Lb.
1/2" and smaller x 6" and shorter	55	58 1/2	60 1/2	61 1/2
1/2" thru 1" x longer than 6"	40 1/2	50	52 1/2	54
Roller thread carriage bolts 1/2 in. & smaller x 6 in. and shorter	55	58 1/2	60 1/2	61 1/2
Lag, all diam. x 6" & shorter	55	58	60	61
Lag, all diam. longer than 6 in.	47	50	52	53
Flow bolts, 1/2" & smaller x 6" and shorter	54	57 1/2	59	60

(Add 25 pct for broken case quantities)

Nuts, Hex, HP reg. & hvy.	Full Case or Keg Price
3/4 in. or smaller	63
3/4 in. to 1 in. inclusive	59 1/2
1 1/4 in. to 1 1/2 in. inclusive	64
1 1/2 in. and larger	58

C.P. Hex regular & hvy.

3/4 in. and smaller	63
3/4 in. to 1 1/4 in. inclusive	59 1/2
1 1/4 in. and larger	58

Hot Galv. Nuts (All Types)

3/4" and smaller	50
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Semi-finished Hex Nuts

3/4 in. and smaller	63
3/4 in. to 1 1/4 in. inclusive	59 1/2
1 1/4 in. and larger	58

(Add 25 pct for broken case or keg quantities)

Finished

1" and smaller	55
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Rivets

	Base per 100 lb
1/2 in. and larger	\$10.85
7/16 in. and smaller	26 1/2

Cap Screws

	Discount (Packages)	Bright Treated	H. C. Heat
New std. hex head, pack- aged			
1/2" diam. and smaller x 6" and shorter	47	54	
3/4" and 1" diam. x 6" and shorter	31	13	
1" diam. and smaller x longer than 6"	18 1/2	+1	
3/4", 1/2" and 1" diam. & longer than 6"	5 1/2	+19 1/2	

C-1018 Steel Full-Finished Carbons Bulk

1/2" through 3/4" dia. x 6" and shorter	47	63
3/4" through 1" dia. x 6" and shorter	31	51 1/2
Minimum quantity—1/4" through 3/4" diam., 15,000 pieces; 1/16" through 3/4" diam., 5,000 pieces; 3/4" through 1" diam., 2,000 pieces.		

Machine Screws & Stove Bolts,

	Discount	Mach.	Stove
		Screws	Bolts
Plain Finish			
Cartons	19	22	
Bulk			
To 1/4" diam. incl.	25,000-200,000	9	54
5/16 to 1/2" diam. incl.	15,000-100,000	9	54
All diam. over 3/4" long	5,000-100,000	—	54

Machine Screw & Stove Bolt Nuts

	Discount	Hex	Square
		16	19
In cartons			
In Bulk			
1/2" diam. & smaller	15,000-100,000	7	9

CAST IRON WATER PIPE INDEX

Birmingham	119.0
New York	131.4
Chicago	125.4
San Francisco-L. A.	140.3
Dec. 1955 value, Class B or heavier 6 in. or larger, bell and spigot pipe. Ex- planation: p. 57, Sept. 1 issue. Source: U. S. Pipe and Foundry Co.	

REFRACTORIES

Fire Clay Brick	Carloads per 1000
First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add \$5.00)	\$128.00
No. 1 Ohio	128.00
Sec. quality, Pa., Md., Ky., Mo., Ill., No. 2 Ohio	114.00
Ground fire clay, net ton, bulk (except Salina, Pa., add \$2.00)	20.00

Silica Brick

Mt. Union, Pa., Ensley, Ala.	\$140.00
Childs, Hays, Pa.	145.00
Chicago District	150.00
Western Utah	144.00-165.00
California	170.00
Super Duty	
Hays, Pa., Athens, Tex., Wind- ham, Warren, O., Morrisville	150.00-157.00
Silica cement, net ton, bulk, Latrobe	26.50
Silica cement, net ton, bulk, Chi- cago	24.00
Silica cement, net tons, bulk, Ens- ley, Ala.	25.50
Silica cement, net ton, bulk, Mt. Union	23.00
Silica cement, net ton, bulk, Utah and Calif.	25.00

Chrome Brick

Standard chemically bonded, Balt.	Per net ton
Standards chemically bonded, Curt- ner, Calif.	\$98.00
Burned, Balt.	108.00
	92.00

Magnesite Brick

Standard Baltimore	\$121.00
Chemically bonded, Baltimore	109.00

Grain Magnesite St. 1/2 to 1/4-in. grains

Domestic, f.o.b. Baltimore in bulk.	\$69.40
Domestic, f.o.b. Chewelah, Wash., Lunenburg, Nev.	43.00
in bulk	49.00
in sacks	49.00

Dead Burned Dolomite

F.o.b. bulk, producing points in:	
Pa., W. Va., Ohio	\$16.00
Midwest	16.35
Missouri Valley	15.00

METAL POWDERS

METAL POWDERS	
Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh	
Swedish sponge iron f.o.b. Riverport, N. J., ocean bags	2.50¢
Canadian sponge iron, Del'd in East, carloads	9.5¢
Domestic sponge iron, 98+% Fe, carload lots	8.5¢
Electrolytic iron, annealed, imported 99.5+% Fe	27.5¢
domestic 99.5+% Fe	26.5¢
Electrolytic iron, unannealed minus 325 mesh, 99+% Fe	57.0¢
Electrolytic iron melting stock, 99.84% pure	32.0¢
Carbonyl iron size 5 to 10 micron, 98%, 0.8+% Fe	\$6.0¢ to \$1.55
Aluminum freight allowed	38.00¢
Brass, 10 ton lots	37.50¢ to 50.00¢
Copper, electrolytic	59.50¢
Copper, reduced	59.50¢
Cadmium, 100-199 lb, 96¢ plus metal value	
Chromium, electrolytic 99.95% min. Fe .03 max. Del'd	\$5.00
Lead	8.90¢ plus metal value
Manganese	70.0¢
Molybdenum, 99%	\$3.35 to \$3.85
Nickel, unannealed	\$1.00
Nickel, annealed	\$1.06
Nickel, spherical, unannealed #20	\$1.13
Silicon	43.50¢
Solder powder, 7.0¢ to 9.0¢ plus met. value	\$4.50
Stainless steel, 302	59.0¢
Stainless steel, 316	\$1.33
Tin	14.00¢ plus metal value
Tungsten, 99% (65 mesh)	\$4.50
Zinc, 10 ton lots	18.75¢ to 22.50¢

Ferroalloy Prices

(Effective Oct. 16, 1956)

Ferrochrome

Contract prices, cents per lb contained			
Cr, lump, bulk, carloads, del'd. 67-71% Cr, 30-1.00% max. Si.			
6.02% C	41.50	0.20% C	38.50
0.03% C	41.00	0.50% C	38.25
0.05% C	39.50	1.00% C	37.50
0.10% C	39.00	1.50% C	37.25
0.15% C	38.75	2.00% C	37.25
4.00-4.50% C, 67.70% Cr, 1-2% Si.	27.75		
3.50-5.00% C, 67-64% Cr, 2.00-4.50% Si	27.75		
0.025% C (Simplex)	34.75		
0.10% C, 50-52% Cr, 2% max Si	35.75		
8.50% max. C, 50-55% Cr, 3-6% Si	24.00		
8.50% C, 50-55% Cr, 3% max Si	24.00		

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max 0.10% C price schedule. Add 5¢ for each additional 0.25% of N.

Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.	
0.10% max. C	\$1.31
0.50% max. C	1.31
9 to 11% C, 33-91% Cr, 0.75% Fe.	1.40

Electrolytic Chromium Metal

Contract prices per lb of metal 2" x D plate (1/4" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.	
Carloads	\$1.29
Ton lots	1.31
Less ton lots	1.33

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-45%, C 0.05% max.)	
Contract price, carloads, delivered, lump, 3-in. x down, per lb of Cr, packed.	
Ton lots	44.65
Less ton lots	48.95
Less ton lots	51.45

Calcium-Silicon

Contract price per lb of alloy, lump, delivered, packed.	
30-33% Cr, 60-65% Si, 3.00 max. Fe.	
Carloads	25.65
Ton lots	27.95
Less ton lots	29.45

Calcium-Manganese-Silicon

Contract prices, cents per lb of alloy, lump, delivered, packed.	
16-20% Ca, 14-18% Mn, 53-59% Si.	
Carloads	24.25
Ton lots	26.15
Less ton lots	27.15

SMZ

Contract prices, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr. 20% Fe 1/4 in. x 12 mesh.	
Ton lots	20.15
Less ton lots	21.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 35-42% Cr, 17-19% Si, 8-11% Mn, packed.	
Carload lots	17.30
Ton lots	18.70
Less ton lots	19.95

Graphidex No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 48 to 52%, Ti 9 to 11% Ca 5 to 7%.	
Carload packed	18.50
Ton lots to carload packed	19.65
Less ton lots	20.90

Ferromanganese

Maximum contract base price, f.o.b., lump size, base content 74 to 76 pct Mn.	
Cents per-lb	
Producing Point	
Marietta, Ashtabula, O.: Alloy,	
W. Va.; Sheffield, Ala.; Portland,	
Ore.	11.75
Johnstown, Pa.	11.75
Sheridan, Pa.	11.75
Philo, Ohio	11.75
S. Duquesne	11.75
Add or subtract 0.1¢ for each 1 pct Mn above or below base content.	
Briquets, delivered, 66 pct Mn:	
Carloads, bulk	13.90
Ton lots packed	16.30

Spiegeleisen

Contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.	
Manganese Silicon	
16 to 19%	3% max. \$97.50
19 to 21%	3% max. 99.50
21 to 23%	3% max. 102.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.	
95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.	
Carload, packed	45.75
Ton lots	47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.	
Carloads	33.00
Ton lots	35.00
250 to 1999 lb	37.00
Premium for hydrogen-removed metal	0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max. Contract price, carloads, lump, bulk, delivered, per lb of contained Mn.	
	24.15

Low-Carb Ferromanganese

Contract price, cents per pound Mn contained, lump size, del'd Mn 85-90%.			
Carloads Ton Less			
0.07% max. C, 0.06% P, 90% Mn.	35.80	36.60	39.80
0.07% max. C	33.75	36.55	37.75
0.10% max. C	33.00	35.80	37.00
0.15% max. C	32.25	35.05	36.25
0.30% max. C	30.75	33.55	34.75
0.50% max. C	30.25	33.05	34.25
0.75% max. C, 80.85% Mn, 5.0-7.0% Si.	27.25	30.05	31.25

Silicomanganese

Contract basis, lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢ f.o.b. shipping point.	
Carloads bulk	12.95
Ton lots	14.60
Briquet contract basis carloads, bulk, delivered, per lb of briquet.	14.40
Ton lots, packed	16.80

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., \$100.00 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., \$93.00.	
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Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, packed.	
Ton lots Carloads	
96.50% Si, 2% Fe	23.95
98% Si, 0.75% Fe	24.45

Silicon Briquets

Contract price, cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si. briquets.	
Carloads, bulk	7.55
Ton lots, packed	10.35

Electric Ferrosilicon

Contract price, cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.	
50% Si	13.50
65% Si	15.25
75% Si	16.40
85% Si	18.10
90% Si	19.50

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.	
Cast Turnings Distilled	
Ton lots	\$2.05 \$2.95 \$3.75
Less ton lots	2.40 3.30 4.55

Ferrovandium

50-55% V contract, basis, delivered, per pound, contained V, carloads, packed.	
Openhearth	3.20
Crucible	3.30
High speed steel (Primus)	3.40

Alsiifer, 20% Al, 40% Si, 40% Fe, Contract basis, f.o.b. Suspension Bridge, N. Y., per lb.

Carloads	10.65¢
Ton lots	11.80¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound

Contained Mo.	\$1.28
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Ferrocolumbium, 50-60%, 2 in. x D contract basis, delivered per pound contained Cb.

Ton lots	\$6.90
Less ton lots	6.95

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, contract basis, del'd, ton lots, 2-in. x D per lb con't Sb plus Ta.

	\$4.95
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Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo.

	\$1.54
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Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., \$4.00 unitage, per gross ton

10 tons to less carload	\$90.00
	\$110.00

Ferrotitanium, 40% regular grade, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti

	\$1.35
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Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti

	\$1.50
Less ton lots	\$1.55

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload, per net ton

	\$215.00
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Ferrotungsten, 1/4 x down, packed, per pounds contained W, ton lots, delivered

	\$3.45
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Molybde oxide, briquets, per lb contained Mo, f.o.b. Langeloth, Pa.

bags, f.o.b. Washington, Pa. Langeloth, Pa.	\$1.32
	\$1.30

Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per lb.

Carload, bulk lump.	18.50¢
Ton lots, packed lump.	20.50¢
Less ton lots	21.00¢

Vanadium oxide, 86-89% V₂O₅ contract basis, per pound contained V₂O₅

	\$1.38
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Zirconium contract basis, per lb of alloy

35-40% f.o.b. freight allowed, carloads, packed	27.25¢
12-15%, del'd lump, bulk-carloads	9.25¢

Boron Agents

Borasil, contract prices per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B

2000 lb carload	\$5.50
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Bortam, f.o.b. Niagara Falls

Ton lots, per pound	45¢
Less ton lots, per pound	50¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5% f.o.b. Suspension Bridge, N. Y., freight allowed

Ton lots per pound	14.00¢
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Ferroboreon, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots

F.o.b. Wash., Pa. Niagara Falls, N. Y., delivered 100 lb up	
10 to 14% B	.85
14 to 19% B	1.20
19% min. B	1.50

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over

No. 1	\$1.05
No. 79	50¢

Manganese-Boron, 75.00% Mn, 15.20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.

Ton lots	\$1.46
Less ton lots	1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots

	\$2.05
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RAILWAY EQUIPMENT FOR SALE

Used - As Is - Reconditioned

RAILWAY CARS

All Types

SERVICE-TESTED® FREIGHT CAR REPAIR PARTS

For All Types of Cars

LOCOMOTIVES

Diesel, Steam, Gasoline,
Diesel-Electric

SPECIAL OFFERINGS

30 Cupola Type, Steel Underframe

CABOOSE CARS

Cast Steel Trucks

5—50-Ton Flat Cars

Immediate Delivery!

RAILWAY TANK CARS and STORAGE TANKS

6,000- 8,000- and 10,000-Gallon
Cleaned and Tested

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50-B Church Street
New York 7, N. Y.
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**"ANYTHING containing IRON
or STEEL"**

THE CLEARING HOUSE

News of Used and Rebuilt Machinery

Steel Mill Buyers . . . A highly specialized type of used machinery salesman—the steel mill specialist—is helping get quite a few expansion programs off the ground. One midwest salesman who preferred to remain anonymous told the IRON AGE that quite a few major steel mills are turning to high grade used equipment for almost-completed expansion programs rather than wait out delivery dates of 6 months or over for new machines. Type of equipment most in demand are roller levelers, plate straighteners, tables, tilt tables, cranes and rolling mills.

Before the Fact . . . Unlike conventional used machinery salesmen, the steel mill specialist almost always has customers lined up before the equipment leaves its original home. Thus there is no warehousing, inventory, etc., simply because few dealers have a backyard big enough. But over the years they have built up a cross-country clearing house type of operation in which they exchange information on who's looking for what—and what's to be had.

Ear to the Ground . . . Through close association built up over years of friendship in steel mill circles, dealers learn which equipment in a mill is due for disposal or replacement. Since inspection trips by casually-interested customers are expensive and elaborate, detailed photographs are taken and brochures are circulated to other dealers and for use as mailing pieces. This may consume up to 6 months before the equipment at a plant is dismantled but it will have a place to go as soon as ready. And in these days of long delivery times, it's a really beat-up piece of equip-

ment that is relegated to the mill "boneyard" for lack of somebody who wants it.

Sell a Mill? . . . By such selling and advertising methods one Ohio dealer has recently sold a 30-in., three-high mill, a cross-country merchant mill, several roller levelers and a plate straightener.

The ambition of dealers is to sell a complete used mill but few have turned the trick. Many do help potential smaller operators line up equipment for re-rolling mills, small re-bar and merchant mills.

Sailing, Sailing . . . Export market for used U. S. steel mill machinery is strong, absorbing up to about 15 pct of available heavier used equipment. Most promising areas are South America, Mexico and Western Europe. European firms can duplicate U. S. new equipment in their homelands at prices under new U. S. prices but generally prefer more conservatively rated U. S. machinery.

Help Wanted . . . Now that members are making available reports on sales of used machine tools, the Statistical Committee of the MDMA is asking their further cooperation. The group would like members to send them estimated sales figures for the years 1947-49. If no running record of yearly sales is maintained, the needed data may be obtained by checking total sales as listed in tax reports for those years and estimating sales of used machine tools to users. Sales data from 1947-49 will be used to form a basing point against which current sales figures can be averaged. Results can then be made available to the trade press and government agencies as percentages of increase or decrease over base period.

CONSIDER GOOD USED EQUIPMENT FIRST

BENDER & STRAIGHTENER

#4 H & J, Capacity 15" I-beams, 9" Girder Rail, 100 lb. Tens. Rail, Motor Drive

BENDING ROLLS

8' x 1/16" Webb 120-V Vertical
12' x 3/8" Southward Pyramid Type
16' x 3/8" Niles Pyramid Type
20' x 1" Hilles & Jones Pyramid Type

BRACKS—LEAF TYPE

12' x 3/4" Dreis & Krump
12' x 3/4" Dreis & Krump Motor Driven

10' x 3/4" Superior Hydraulic, NEW
12' x 3/4" Superior Hydraulic, NEW

BRIGGETTING PRESS

Model 350 Milwaukee Hydr. Brigetting Press Complete with Pumps and Motors

CRANES—OVERHEAD ELECTRIC TRAVELING

5 ton P&H 25' Span 230 Volt D.C.
5 ton Whiting 45' Span 220/2/60 A.C.
5 ton Shaw 56' Span 230 Volt D.C.
10 ton Cyclops 40' Span 220/440 A.C.
10 ton Niles 70' Span 220 Volt A.C.
15 ton P&H 46' Span 230 Volt D.C.
15 ton Morgan 70' Span 220 Volt A.C.
25 ton Cleveland 70' Span 220 Volt A.C.
25 ton L-B 75' Span 220/3/60 A.C.

Incl. 300 ft. Runway

60 ton Modern 60' Span 220/3/60
80 ton Niles 72' Span 230 Volt D.C.
120 ton Niles 68' Span 440/3/60 A.C.

FORGING MACHINES

1" to 5" Acme, Ajax, National

HAMMERS—BOARD DROP—STEAM DROP—STEAM

FORGING—800 lb. to 20,000 lb.

LEVELLERS—ROLLER

44" Newbold, Nine Rolls 4" Dia.
54" Actna Standard, 17 Rolls 3 1/2" Dia.
72" McKay, 17 Rolls 4 1/2" Dia.

PRESSES—HYDRAULIC

250 ton Bliss Double Acting 42" Stroke 48x48" Bed
500 ton Elmes 18" Stroke Lower Platen 38" x 66"
750 ton Baldwin Triple Acting Bolster 64" x 128"
1200 ton United Steam Hydraulic Forging Press
4500 Baldwin-Lima-Hamilton Hydr. Forging Press

PRESS—INCLINED

125 ton Beatty Open Back, 1 1/2" Stroke, Area of Bed 28 1/2" x 26 1/2"

PRESS—STRAIGHT SIDE

Clearing Model TF41500-200 Triple Acting Strokes 40, 32, 14", Bed Area 100" x 200"

100 ton Clearing, 14" Stroke, 36" x 36" Bed
250 ton Bliss, 16" Stroke, 28" x 23" Bed
250 ton Toledo, 6" Stroke, 36" x 72" Bed

PUNCH & SHEAR COMBINATIONS

#44 x 48 Buffalo RAP, Capacity 1/2" x 1/2"
Cleveland Style G Single End, 60" Throat
No. 1 1/2 Buffalo Universal Ironworker

ROLLS—PLATE STRAIGHTENING

72" Bortsch, Seven Rolls 7" Dia.
80" H & J, Six Rolls 10" Dia.
13" Newbold, Nine Rolls 14" Dia.

ROLLING MILLS

10" x 16" Single Stand, Two High
12" x 14" Twelve Stand, Two High Strip Mill
12" x 16" Phila. Single Stand, Two High
15" x 30" G & M Single Stand, Two High
16" x 24" Farrel Two Stand, Two High

20" x 60" Two High Breakdown Mill
26" x 54" United Single Stand, Two High
26" x 72" H.P. Cold Rolling Mill
44" x 28" x 44" x 144" Three High
22" x 12" x 40" Lewis 3-High Shut Mill

SHEAR ANGLE

6" x 6" x 3/8" Hilles & Jones

SHEAR—GATE

60" x 1 1/2" Fols Model S T A U—23. All Steel

SHEAR—ROTARY

#23A Quickwork Whiting, 2/16" Capy.
#250 Kling, 1/4" Capy.

SHEARS—SQUARING

8" x 1/2" Niagara, LATE
10" x 1/2" Cincinnati, LATE
16" x 1/2" Toledo

SLITTERS

12" Blake & Johnson
32" Yoder #3, 5" Arbor, Motor Driven

SPRING COILING MACHINE

Model W-20 Torrington. Wire Dia. .003" to .028"
Wire Length per spring .57" to .665"

SWAGING MACHINE

#6 1/4 Fenn, Capacity 2 1/2" Tube, 3 1/2" Solid 10"
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1	1250	720	G.E.	680	2300/4160
1	1000	720	Whase.	680	2300/4160
1	500	1200	Whase.	125/250	2300/440
1	500	720	Cr. Wh.	575/400	2300
1	300	1200	Al. Ch.	575/400	2300
1	300	1200	G.E.	250	2300
1	300	1200	Cr. Wh.	250	2300
1	200	1200	Elliot	125	4000/2300
1	200	900	G.E.	250	2300
1	175	1200	G.E.	250	440/220
2	150	1200	Whase.	8K	250
2	150	1200	Reliance	125	2300/440
1	150	1200	G.E.	250	2300
1	100	1200	Whase.	8K	125/250
1	100	1200	Al. Ch.	250	4000/2300

DIRECT CURRENT MOTORS

Qu.	H.P.	Make	Type	Volts	R.P.M.
1	1500	Whase.	Dist.	525	640
1	1000	G.E.	MIL	600	150/300
1	1050	G.E.	MPC	550	80
1	675	Al. Ch.	Rev.	550	65
2	600	Al. Ch.	MIL	600	200/600
1	500	Whase.	Rev.	250	285/700
1	350	G.E.	CD 160A	230	1150
1	300	Whase.	MIL	230	300
2	275	Whase.	MIL	230	425/850
1	220/250	El. Dy.	Pod. Brg.	230	400/1200
1	180	G.E.	MPC	230	400
1	175	G.E.	CD 175A	230	850/1025
1	150	Whase.	SK 301	230	300/900
2	125	Whase.	SK 184	230	575/850
1	125	G.E.	MPC	230	400/600
1	100	El. Dy.	30 S	230	450/1350
1	80	Rel.	851 T	230	575/1150
2	75	Whase.	SK	230	250/1000
1	60/80	El. Dy.	25 S	230	525/1050
1	50	Whase.	SK 141	230	250/1000
1	35	Whase.	SK	230	250/1000
2	30/40	Whase.	SK 143	230	500/1500
1	20/25	Whase.	SK 121	230	200/300
3	5/7 1/2	Rel.	TEPC	230	337/1350

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Qu.	H.P.	Make	Type	Volts	Speed
2	1500	G.E.	M-579BS	4000/2400	1800
1	1500	G.E.	MT	6000	1187
1	1500	G.E.	MT	6000	233
1	1100	F.M.	OVZK, B.B.	4800/2400	1800
1	1000	A.C.	MIL	2300	240
1	800	G.E.	MT	2300	203
1	750	G.E.	MT-573	2300	1190
1	700	A.C.	MT	2300	500
1	500	Whase.	CW	550	350
1	400	Whase.	CW-960A	440	1170
1	400	Whase.	CW	440	514
1	400	Whase.	CW-1213	2200	435
1	350	G.E.	TM-17A	440/2200	720
1	250	G.E.	MT-424T	4000	257
1	250	G.E.	MT-5398	2300	1800
1	250	Al. Ch.	250B	550	600
1	200	Cr. Wh.	IM	440	500
1	200	G.E.	TM	2300	580
1	150 (unused)	Whase.	CW	2300	435
2	125	A.C.	ANY	440	695
1	100	G.E.	TM-16	2300	435
3	100	A.C.	ANY	440	695

SQUIRREL CAGE

Qu.	H.P.	Make	Type	Volts	RPM
1	800	G.E.	KT-573	2200	1180
2	650	G.E.	PT-559BY	440	3370
2	450	Whase.	CS-1420	2300/4150	354
1	400	G.E.	IK	2300	500
1	200	G.E.	IK-17	440	500
3	200	G.E.	KT-557	440	1800
1	150/75	G.E.	IK	440/900/450	
1	150	Whase.	CS-8508	440	880
1	150	Whase.	CS	440	500

SYNCHRONOUS

Qu.	H.P.	Make	Type	Volts	RPM
1	7000	G.E.	ATT	2200/6000	600
1	4350	G.E.	2501RL4000/6000/13500	514	
1	2850	Whase.	S p.f.	2300/4000	514
1	2800	Whase.	S p.f.	2300	720
2	2600	Whase.	ATT	2300	120
2	1750	G.E.	ATT	2300	3600
1	735	G.E.	ATT	2200/12000	600
1	500	G.E.	TS-7367	2200	1200
1	450	Whase.	ATT	2200	128.5
1	450	Whase.	ATT	2200	450
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1	225	G.E.	ATT	440	1800

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No. 6-1 Nazer, pneumatic, late.

No. 8B Nazer, self-contained.

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15" 30" Lipe Carbo-Matic, 1942.

36" x 42" Bullard New Era vertical turret lathe.

120" x 90" CC Niles Cement Feed engine lathes, 60 HP, M.D.

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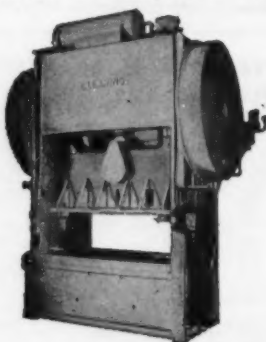
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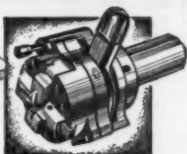
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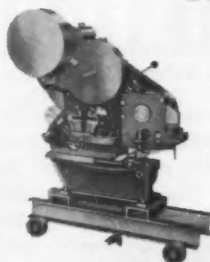
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Administration Seeks T-H Overhaul

Secretary of Labor James P. Mitchell said he will form a committee composed of representatives of the Construction Industry and the Building Trades Department of the AFL-CIO to develop specific recommendations for amending the Taft-Hartley Act applications to the building and construction trades.

Housing Starts Lower

Nonfarm housing starts declined more than seasonally in September to 93,000 dwelling units, the U. S. Dept. of Labor reports. The 8000-unit decrease from August occurred chiefly in metropolitan areas and was divided evenly between conventional and government assisted mortgages. West Coast was hardest hit.

Material Handling Equipment Sales Up

Bookings of material handling equipment manufacturers through August are 26.82 pct higher than total average bookings for 1955, according to the Material Handling Institute. The August index stands at 168.70, an increase of 62.46 points over the same month last year. Industry leaders expect 1956 sales will far exceed the 10 pct increase predicted earlier this year.

Britain To Export Tinplate in 1957

Great Britain expects to reenter the world tinplate market next year as an aggressive exporter rather than an importer. New installations at the Steel Co. of Wales and Ebbw Vale Works of Richard Thomas & Baldwins will help boost 1957 output 25 pct above 1956 levels. Current world tinplate price is about 17 pct above that in Britain and steelmen there are optimistic over foreign sales prospects.

Big Order For General Electric

General Electric Co. is starting work on \$35 million worth of pumpless rectifier systems for four major producers of aluminum. They will be the first pumpless rectifiers built in this country.

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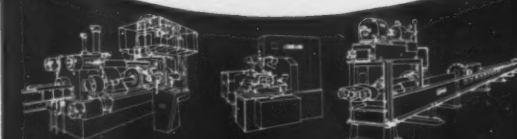
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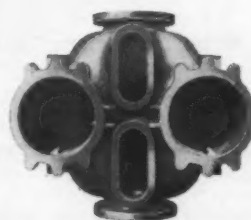


LOMBARD CORPORATION
639 WICK AVE. • YOUNGSTOWN 1, OHIO

KUTZTOWN *Skill*

CREATES A STRAINER CASTING

made of Ni-Resist



Note the slots inside this casting and the cleanly shaped flange supports. Small lids were also cast but are not shown in the photograph.

Ni-Resist (developed by the International Nickel Co.) is a special nickel alloy of the gray iron type possessing remarkable qualities of corrosion and heat resistance. It is resistant to the corrosive effects of alkalis, acids, salts, plastics, foods and oils.

Whether the castings you need are classified as usual or unusual, we are anxious to prove to you that Kutztown castings are accurately and economically produced. No order is too large or too small for Kutztown to handle. Your inquiry is most welcome!


There are many casting applications in the chemical, food, oil and drug industries where extreme heat is present — such applications can be met easily by the use of castings of Ni-Resist!

We'll be happy to place your name on our mailing list to receive regular issues of the "Kutztown REVIEW".

• GRAY IRON • PRESSURE IRON • HIGH TENSILE IRON • NI-RESIST
• LO-ALLOY IRON • DUCTILE IRON

KUTZTOWN FOUNDRY & MACHINE CORP.

KUTZTOWN, PENNSYLVANIA



ARMSTRONG T-SLOT CLAMPS

Make rigid set-ups in minutes on planers, drill presses, milling machines or other T-slotted beds or platens. Clamp slides or rotates to position on anchoring T-slot bolt. Drop forged, heat-treated body. Heat-treated screw has V-slotted swivel cap.

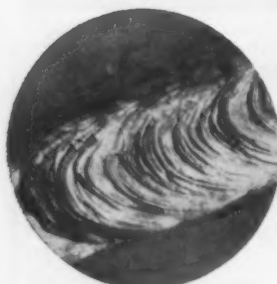
ARMSTRONG BROS. TOOL CO.
Write for "The Tool Holder People"
Bulletin SUT 5209 Armstrong Ave., Chicago 30, U.S.A.

NEW

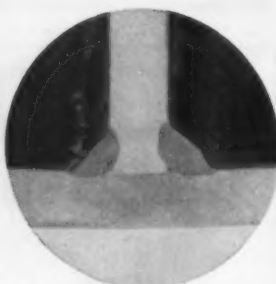
ARCOS

AEROCOR and FABRICOR DC ELECTRODES

***Assure all the benefits
and properties you want
when welding stainless steels**



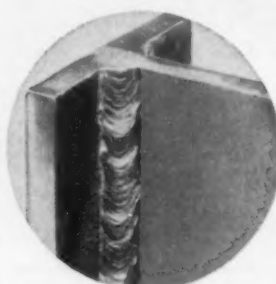
***sound weld metal . . .
good bead appearance**



***proper weld contour . . .
good penetration**



***quick, easy slag removal**



***sound fillet welds—even when
welded vertical up**

● Whatever benefit you need, you'll get it along with easier, faster welding when you use *new* AEROCOR or FABRICOR DC Electrodes.

The AEROCOR Series is especially designed for welding stainless sheet metal. The FABRICOR Series is especially designed for heavy metal fabrication. Both are available in a wide range of stainless grades and diameters. Both are used with DC reverse polarity current.

Before being publicly introduced, both types of these *easy-to-use* electrodes were demonstrated and tested in a

group of specially selected plants and weld shops. The opinion of everyone involved was practically unanimous: AEROCOR and FABRICOR Electrodes are easiest to use . . . most uniform and dependable in results.

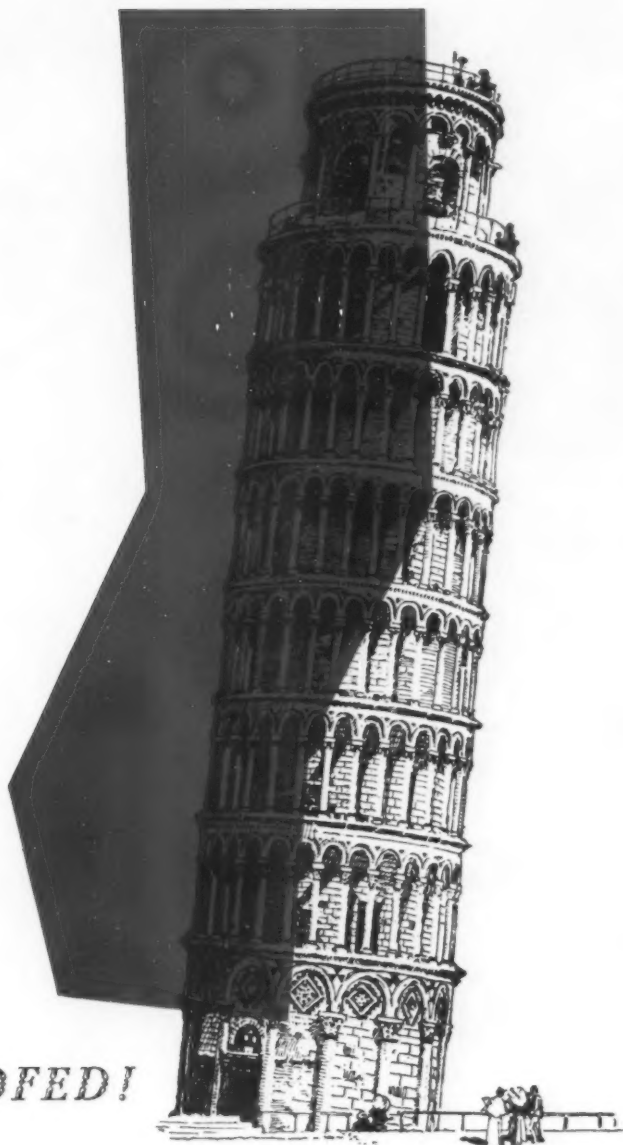
Electrode	Types Available						
Aerocor	308	309	310	316	347	349	410
Fabricor	308	309	310	316	347	—	—

FOR A FREE DEMONSTRATION in your own plant, simply drop us a line on your company letterhead. Of course, there's no obligation.

More than ever it pays to . . . WELD WITH

ARCOS

ARCOS CORPORATION • 1500 South 50th Street • Philadelphia 43, Pa.



SOMEBODY GOOFED!

Only by a freak of fortune does the leaning tower of Pisa still stand. A faulty foundation was not apparent until the structure was three stories high. It is believed the architects were then forced to compensate by adding weight to the opposite side to save the building.

Are you building corrosion problems into your plant structures and equipment that will inevitably have to be compensated for by tremendous replacement costs? Many of these costs can be eliminated *at the planning stage* by taking advantage of the services of an expert in the field of corrosion resistant coatings...the Amercoat Sales Engineer.

The Amercoat Sales Engineer is trained in the principle that in corrosion engineering, too, foundations are all-important. You can put this factory-trained man on your staff, so to speak, without cost or obligation. His advice will be truly objective since it is based on a knowledge of all types of protective coatings and more than 43,000 case histories in our files. You can be sure that the Amercoat coating he recommends, whether vinyl, phenolic, epoxy or any other type, will be the right one for *your* job, and the most economical on the basis of cost per square foot per year.

Therefore, to effect important economies in specifying protective coatings you are cordially invited to call on your Amercoat Sales Engineer...*right at the beginning*. He will analyze all per-

tinent data concerning your corrosion problems based on our nearly 20 years of corrosion control experience, and give you a comprehensive recommendation. In addition to recommending the proper coatings, he will assist you in writing complete specifications. However, this is not the full extent of his service: he will also be available for consultation at the job site to insure proper application.

There are more than 70 Amercoat Sales Engineers and Distributors located throughout the country. It will pay you to talk to one of these men whether you are building a new plant or are interested in the efficient maintenance of existing facilities. The same service is available and equally important savings can be realized in both cases.

May we send you the name of the Amercoat man nearest you? Literature containing many helpful suggestions for the design and corrosion engineer is also available on request. Write to: Amercoat Corporation, 4809 Firestone Blvd., South Gate, Calif.

"Follow the Line of
MOST Resistance"

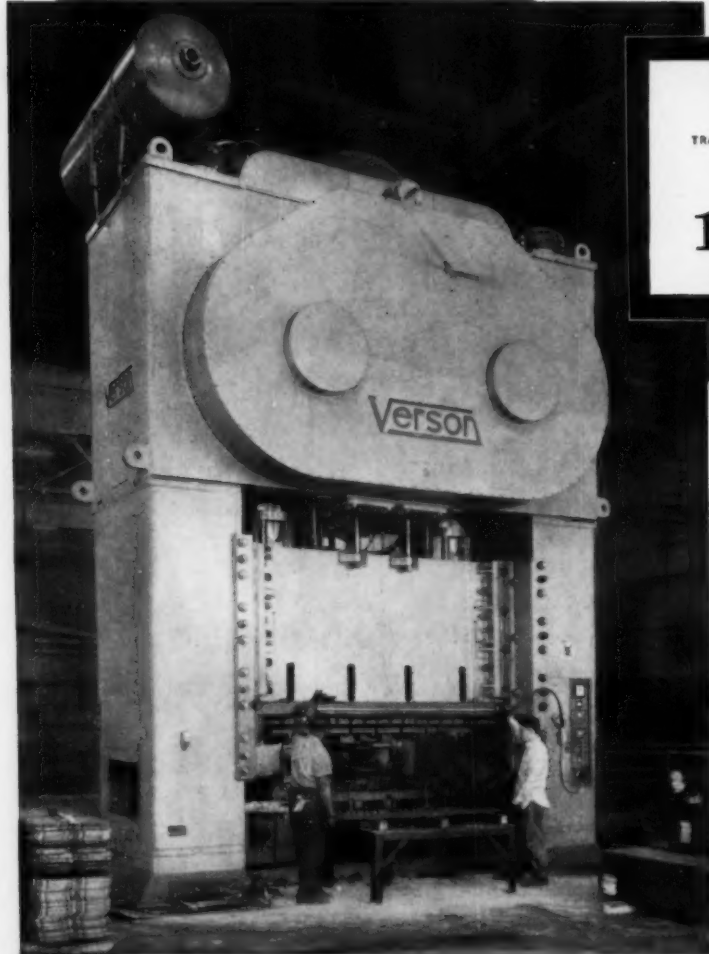
Amercoat

CORPORATION Dept. T.J.

4809 Firestone Blvd., South Gate, Calif.

Houston, Texas • Jacksonville, Florida • Evanston, Illinois • Kenilworth, New Jersey

Front to Back Crank Arrangement of this



Verson 1800 Ton Press

eliminates
need
for
extra long
shaft

Verson Presses offer features that bring accuracy, dependability and economy to a wide range of metal forming operations. The Verson Allsteel Frame, anti-overlap clutch and brake unit, square type gibs and non-oscillating vertical type adjusting screw are examples of the engineering and design that are a part of every Verson Press.

The press illustrated is a Verson 1800 Ton, twin gear, double crank. Two crankshafts are arranged front to back to eliminate the necessity of an extra

long crankshaft. Gearing for the press can be installed and removed through the front of the crown allowing installation in areas with low overhead clearance. The machine was built to J.I.C. standards and has all electrical wiring and equipment, lubrication piping, air piping and controls installed internally.

We will be pleased to recommend Verson Presses to fit your production process. Just send an outline of your requirements.

A Verson Press for every job from 60 tons up.



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VERSON ALLSTEEL PRESS CO.

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